Investigating the Implementation of Blended Provisions for an Introductory Computer Module

Vassilia Stefanou, BSc (distinction), MSc

December 2020.

This thesis is submitted in partial fulfilment of the requirements for the degree of Doctor of Philosophy.

Department of Educational Research,

Lancaster University, UK.

This thesis results entirely from my own work and has not been offered previously for any other degree or diploma.

The word-length conforms to the permitted maximum of 50,000.

Word count: 50,646

Signature  .....

Vassilia Stefanou, BSc (distinction), MSc

Investigating the Implementation of Blended Provisions for an Introductory Computer Module

Doctor of Philosophy, December 2020

Abstract

This thesis describes a qualitative single exploratory case study whose purpose was to explore the potential transition of an introductory computer module of College X to a blended learning mode; this was implemented by investigating the perceptions of instructors and students regarding this potential transition, analysing these perceptions using thematic analysis, and framing these within the conceptual framework suggested by Passey (2019). In this respect, integrating ‘new’ ways of teaching and learning for implementing blended learning provision for higher education followed the steps suggested by Passey (2019). The process involved: (1) identifying the elements of the module under investigation that need to remain on-site; (2) associate the remaining elements to suitable ‘new’ ways of learning; (3) associate these elements to appropriate forms of interaction; (4) match these elements to relevant educator modes; and (5) identify the appropriate technology resources to support these elements. This process produced a set of tools that may serve as conceptual frameworks related to the relationships between online elements, educator modes, ‘new’ ways of learning, and

interaction forms. Finally, the study's findings include identified benefits and challenges related to blended learning provisions, as perceived by this study's participants, aligned with evidence from the prevailing literature. The findings will be used to inform the eventual implementation of a blended learning provision for the said module.

Contents

Acknowledgements

I would like to express my sincere gratitude to my supervisor Prof. Don Passey for the continuous support of my research; I would not have been able to complete this thesis without his enlightening feedback.

In addition, I would like to thank my family, and in particular my son, who was not only patient but also very supportive, in spite of my very frequent unavailability due to the additional workload - he had more faith in me than I did; my sisters, each helping me with her own special way; and my parents, for inspiring me, for always believing in me, and for helping me in any possible way.

I would also like to thank my support group of friends who were always there for me in times of despair, patiently listening to my concerns, ready to reassure me and boost me with confidence.

I am in debt to my Department Head and all my colleagues, for their invaluable participation in the study, for the stimulated discussions, and for volunteering to undertake additional departmental tasks in order to relieve me and give me the time needed to complete this thesis.

Finally, I am grateful to my College for their support, and for sponsoring a great part of the fees of this PhD.

Publications derived from Work on the Doctoral Programme

Kotsovoulou, M., & Stefanou, V. (2016). Student perceptions on the effectiveness of collaborative problem-based learning using online pair programming tools. In J. Strouhal (Ed.), Proceedings of the 12th International Conference on Educational Technologies (EDUTE ’16) (pp.32–39). Barcelona, Spain: WSEAS.

Kotsovoulou, M., Stefanou, V., & Makri, D. (2017). Utilization of Learning Resources by Undergraduate-level Students in Computer Programming Courses: An Exploratory Study. WSEAS Transactions on Advances in Engineering Education, 14, 65–75.

Stefanou, V. (2013a). Exploring the Affordances of Facebook Groups. International Journal of Knowledge Society Research, 4(4), 36–51. https://doi.org/10.4018/ijksr.2013100105

Stefanou, V. (2013b). What is Considered “Blended Learning” in Higher Education? International Journal of Knowledge Society Research, 4(1), 108–116. https://doi.org/http://dx.doi.org/10.4018/jksr.2013010108

Stefanou, V. (2014). Intercultural design in e-learning: A comparison of three different approaches. In P.L.P. Rau (Ed.), CCD/HCII 2014 (pp.585–596). Heraklion, Crete: Springer, Cham. https://doi.org/10.1007/978-3-319-07308-8_56

Stefanou, V. (2015). An investigation of the ways professors and students experience the integration of technology in the traditional, face-to-face delivery of an introductory computer course. Presentation at the Postgraduate Research Conference. Lancaster, UK.

Stefanou, V., & Kotsovoulou, M. (2016). Use of Powerpoint in the Classroom: A Participatory Research Project. International Journal of Knowledge Society Research, 7(3), 38–50.

Stefanou, V., & Kotsovoulou, M. (2017). Use of Presentations in the Classroom. How Innovative can it be? In M. Lytras, L. Daniela, & A. Visvizi (Eds.), Enhancing Knowledge Discovery and Innovation in the Digital Era (pp.162–175). Hershey, PA: IGI Global.

Stefanou, V., Kotsovoulou, M., & Makri, D. (2018). Using E-Assessment Software to Support Formative Assessment: A Phenomenographic Study of Instructors' Experiences. In L. Gómez Chova, A. López Martínez, & I. Candel Torres (Eds.), INTED2018 Proceedings (pp.1066–1075). Valencia: IATED. https://doi.org/10.21125/inted.2018.0138

List of Figures

List of Tables

Chapter 1 Introduction

1.1 Introduction to the Study

Technology, in many of its forms, has been utilised as a supporting tool for teaching and learning for many centuries. As technology has evolved, its uses within an educational context have also progressed, and the emergence of numerous ‘new’ learning forms and modalities can be largely attributed to the role of digital technologies in the overall learning experience. Distance learning, e-learning, online learning, and blended learning stand out as some of the ‘new’ learning modalities that claim a share in the spotlight of the evolution of technology in education - in many cases neither are their differences very clear, nor are there recognised ways to utilise them effectively towards pedagogical contribution. Multiple studies have been conducted regarding these concerns, and the effectiveness of these ‘new’ modalities in respect to how - and if - these may contribute to enhanced teaching and learning experiences; even more studies have investigated the implications of the uses of technology in education, as benefits are usually accompanied by challenges.

My professional role as an information systems professor in a small college has triggered a personal interest in the use of technology within an educational context, primarily from the perspective of how this use may inform the teaching pedagogy inside and outside the conventional classroom. Moreover, having served as the module leader of the ‘Introduction to

Information Systems' module prompted my desire to explore potential ways of improving the teaching and learning experience of this particular module.

This personal interest has shaped my epistemological stance into a pragmatist one, and this study aims to propose practical solutions leading to suggestions and initiatives for change, as advocated by pragmatism (Morgan, 2014); hopefully, this study may be of pragmatic value on multiple levels: on a personal level, to advance my own pedagogy; on a departmental level, to enhance the overall teaching and learning experience of the module under investigation, and possibly other modules in my department; finally, on an institutional level, to serve as a model for other departments.

Hence, this thesis seeks to address this subject by describing a qualitative case study whose purpose is to explore the potential transition of the 'Introduction to Information Systems' module of the Management Information Systems (MIS) Department of College X, from the current conventional face-to-face format to blended learning mode. In order to effectively do this, it is considered necessary to explain first the rationale behind the need for this research by presenting contextual information about the case under investigation, introducing the specific college, the specific department, and the specific module; this will be done in the next section, and will be followed by the emerging research questions that guided this study.

1.2 Contextual Information

1.2.1 The College

College X is a small, private, non-profit American college located in Eastern Europe, with 54,000 alumni all over the world. It is accredited by the New England Commission of Higher Education (NECHE) and it has been honoured by the Academy of Athens for its contribution to education. Currently, the College has three divisions: a secondary education school, carrying on the tradition of the originally founded institution; a graduate business school; and an undergraduate and graduate division. This last division also launched in 2011 a degree validation agreement with the Open University (OU) of the United Kingdom (UK), so, upon successful completion of their studies, graduates receive both a United States (US) and a British degree. For the purposes of this thesis, the focus will be on this undergraduate and graduate division of College X, with currently 276 faculty members and 4,203 students, 3,439 of whom are undergraduate. The majority of these undergraduate students comprise people enrolled in one of the College's twenty-seven degrees (programmes); however, there are also students attending local public universities, who can also be enrolled to the College as parallel studies students. In addition, there is an increasing number of international students who enrol at College X for one or two semesters as visiting study abroad students, from over fifty partner universities and colleges in the US, Europe, and Asia.

There are five academic periods over an academic year: Fall semester, running from September until December; Spring semester, from January until April; Summer term, from May until July; Summer session I, mid-May to mid-June; and Summer session II, in July. The total amount of contact time of a typical fifteen UK-credits module is approximately thirty hours per academic period, so semesters typically run for thirteen weeks, with two and a half hours of contact time per week, which could be spread as three fifty-minute classes, two seventy-five-minute classes, or in a few cases, one hundred-and-fifty minute-classes. The summer periods are more intensive; sessions run for one month each, with classes typically meeting daily for two consecutive fifty-minute classes, while summer term runs for eight weeks, with classes typically meeting Monday to Thursday for seventy minutes.

The average class size of most modules is relatively small; depending on the module, this can be from fifteen to thirty students per class. In many departments, there are modules that run as ‘multi-section’, i.e. each semester, there are multiple occurrences of these modules, each with its own professor and its own timetabled sessions; students register for a specific module occurrence, which they attend for the duration of the semester. College X uses the term ‘section’ to refer to each module occurrence; modules that are multi-section share common assessments and outline.

The standard teaching mode is the conventional, face-to-face classroom setting; nevertheless, a few blended and fully online modules have been recently introduced. The first successful attempt at blended learning at

College X was implemented by the graduate section in 2015; the pilot programme was a graduate certificate in psychology. The programme was initially designed with two out of its four modules offered in blended mode, and eventually transitioned to a fully blended programme with all its modules reducing the physical attendance requirement to eleven out of the nineteen class meetings. Following the successful implementation of this programme, one more graduate programme was designed with blended provision, a Master of Arts in Teaching English to Speakers of Other Languages. As the two graduate programmes operated successfully, the team of instructional designers of College X were asked to explore the potential of designing blended and/or fully online modules for undergraduate programmes too. As a result, at the moment, a total of four undergraduate modules do not use the traditional, face-to-face classroom delivery mode: one section of an introductory music module runs fully online, without any physical attendance requirement, while three other modules run in blended mode. The blended ones include an information technology module with just one prerequisite, a first-year introductory physics module, and one section of a second-year English module - this English module is a multi-section one, so only one section runs as blended while all the other sections run as conventional, face-to-face classes. This also applies to the introductory music module that runs online, i.e. students may choose to enrol to either the online section or to a conventional one.

This quite recent interest of College X in exploring these new pedagogies has prompted faculty to consider these as alternative delivery modes; to support

faculty in such endeavours, the College formed a team of three instructional designers, and a set of guidelines regarding online and blended learning were developed. These guidelines are in the form of a handbook, which is frequently revised by the instructional designers and the College administration, welcoming relevant input and feedback from the faculty. Among others, this handbook states that for a module to be considered as blended within the context of College X, the proportion of the online component has to be between thirty and fifty percent of the class meetings. It is also stated that completion of online activities is regarded as the equivalent of students' presence in the virtual online classroom, so failure to complete the designated assignments results in an absence on that day's class. Moreover, the College runs a thirty-five-hour seminar called 'Online Faculty Seminar' (OFT), in order to train faculty so that they will be able to utilise the new learning forms; the OFT seminar runs in blended mode itself, so participants get a first-hand experience. The College urges faculty to complete this seminar, as the current policy states that only faculty members who have successfully completed the OFT may teach an online or blended module. Furthermore, as stated in the College's Blended Teaching Handbook, these faculty members are also allowed to use online make-up classes as substitutes of missed face-to-face classes when teaching conventional modules.

1.2.2 The Module

The module under investigation in this study is the ‘Introduction to Information Systems’ module of the Management Information Systems (MIS) Department. As implied by its title, this is an introductory module that is a requirement in almost all programmes - the only programme that does not use it is the ‘Information Technology’ programme of the homonymous department, as two years ago they designed their own introductory module with more emphasis on computer programming. Consequently, given the number of students expected to enrol in the ‘Introduction to Information Systems’ module, this is typically scheduled in four out of the five academic terms, i.e. Fall and Spring semesters and Summer Sessions I and II. As the main body of incoming students start their studies during the two semesters, there is a need for multiple sections of this module for these periods, typically eight to eleven, each one scheduled at a different time slot. Summer sessions do not have so many incoming students, so one section of the module is usually adequate for each of these periods. There are nine faculty members of the MIS Department who can teach this module. It should be noted that the module has two summative assessments, a project carrying forty percent of the overall grade, and a final examination for the remaining sixty percent. It also has a laboratory component, which requires an additional fifteen contact hours per academic term; hence, it is possible for a section to have a different theory and laboratory instructor.

Given the College's recent interest in new ways of teaching and learning, the option of converting one or more modules to online or blended modes has been a topic of discussion in the MIS Department during recent years. Being the module leader of the aforementioned module, I was keen in exploring the potential applicability of these new pedagogies to this introductory module; given the nature of this introductory computer module, the fully online modality was not an option, as the College's guidelines regarding this excluded modules with any practical, hands-on component. Nevertheless, blended learning seemed quite promising, so I decided to explore this new way of accommodating learning using the said module as a case study.

1.3 Research Questions

Taking into consideration the above, the main research question that was formulated was "What are the prospects and implications of a transition towards blended learning in an introductory computer information systems module at college level?" From this main question, three secondary research questions emerged: (1) "How can students' and instructors' perceptions and responses to the potential transition be used to evaluate the implementation of this blended learning model?"; (2) "What key features should a blended learning model entail when implemented in an introductory computer module such as 'Introduction to Information Systems'?"; and (3) "What are the benefits and drawbacks of blended learning models in higher education?"

This thesis will address these questions in the following seven chapters. First, the necessary evidence from the prevailing relevant literature will be

presented, starting with a survey of the history of technology in education in Chapter 2, as it is considered important to demonstrate the significant milestones in this timeline, along with the effect of the gradual evolution of technology in educational settings. The literature review will continue in Chapter 3 with a presentation of e-learning, online learning, and eventually blended learning, as the leading ‘new’ ways of learning. This chapter will widely cover representative literature in the subject, considering commonly used definitions, clarifying misconceptions, comparing ‘new’ ways of learning, with a special emphasis on comparing blended learning provision to traditional/face-to-face, technology integration, and fully online formats, pointing out cited advantages and disadvantages of a blended learning mode. Having established the characteristics of blended learning, Chapter 4 will discuss one of the prevailing frameworks for implementing a blended learning provision within the context of a higher education environment. This is Passey's (2019) model, that was chosen to conceptually frame this thesis’s case study regarding the steps towards developing a blended learning provision. Chapter 5 is the methodology chapter. The first part of this chapter will discuss and justify the choices made within the context of this study in respect to the methodology, research design, data collection, and data analysis; the detailed description of the steps that were followed is reported in the second part of the same chapter. Chapter 6 will then present the findings of this study, which are discussed and analysed in Chapter 7, conceptually framed by Passey's (2019) framework. Finally, Chapter 8 completes this thesis with derived conclusions and contributions of this research.

Chapter 2 Technology in Education

2.1 History of Technology Integration in Education

Using technology to support teaching and learning is not an exclusive achievement of the 21st century. Educators have historically attempted to incorporate various instruments into their teaching, aiming both at automating instruction and hence facilitating their work, and at enhancing their pupils' learning. Throughout the history of education, technology appears to be an integral part of most educational milestones, highly promising for both students and instructors, eliciting new didactic dimensions (Ferster, 2014; Firmin & Genesi, 2013; Hofmann, 2006; Roblyer, 2016; Saettler, 2004; Wheeler, 2001). Hofmann (2006) maintains that an extensive variety of learning technologies was at the disposal of educators since at least the 19th century. Paul Saettler, a well-known and highly cited educational technology historian, talks about the use of instructional technologies at even older times, and he explains that "educational technology is essentially the product of a great historical stream consisting of trial and error, long practice and imitation, and sporadic manifestations of unusual individual creativity and persuasion" (Saettler, 2004, p.4).

Before charting a chronology of the key moments in the history of technology integration in education, a clarification of all related terms along with prevailing definitions will follow.

2.1.1 Definitions

The term technology is quite broad, and it is certainly not restricted to digital devices. Technology “can be anything from a pencil to a virtual environment” (Roblyer, 2016, p.6), and it is by nature rapidly and continuously evolving (Ferster, 2014). It is quite common to refer to technology used in educational contexts as ‘educational technology’ or ‘instructional technology’; nevertheless, it is important at this point to provide clear definitions of key related concepts.

2.1.1.1 Educational Technology

One of the most popular and established terms is the one of ‘educational technology’. Given that this term is essentially an application domain, hence bound to the broader environment and context in which it is employed, it comes as no surprise that its meaning has changed and evolved over time (Ferster, 2014; Roblyer, 2016). A definition produced by a 1970 commission on the subject referred to educational technology as “the media born of the communication revolution which can be used for instructional purposes…[and] a systematic way of designing, carrying out, and evaluating the total process of learning and teaching” (Saettler, 2004, p.6). The same commission implied that the future might bring a wider definition involving not just tools but also processes, a prophecy that eventually was fulfilled (Roblyer, 2016; Saettler, 2004). In the 1990s, computers started gradually attracting the attention of teaching professionals who realised the potential value of computers as a pool of resources that included media, computer-based support systems, and

instructional systems. Subsequently, the concept of ‘educational computing’ of the time progressed to include applications supporting not only instructors, but administrators as well, and eventually became identified with the concept of educational technology (Roblyer, 2016).

Aligned with the ever-changing and evolving nature of technology, the focus of organisations such as the Association for Educational Communications and Technology (AECT) and the International Society for Technology in Education (ISTE) expanded from audio-visual (AV) devices and computer-automated instruction systems respectively to any electronic devices and systems that may facilitate both teaching and learning (AECT, 2001; ISTE, 2018). Consequently, one of the latest official definitions created by the Definition and Terminology Committee of AECT states that “Educational technology is the study and ethical practice of facilitating learning and improving performance by creating, using, and managing appropriate technological processes and resources” (Januszewski & Molenda, 2008, p.1), while ISTE provides a more simplified and compact definition proclaiming that “Educational technology is the full range of digital hardware and software used to support teaching and learning across the curriculum” (Roblyer, 2016, p.5). Drawing from the above, Roblyer (2016, p.6) defines educational technology as “a combination of the processes and tools involved in addressing educational needs and problems, with an emphasis on applying the most current digital and information tools”.

2.1.1.2 Instructional Technology

Closely related to educational technology is the term ‘instructional technology’. Seels and Richey (1994, p.1) define this as “the theory and practice of design, development, utilization, management and evaluation of processes and resources for learning”. Building on this definition, Roblyer (2016) adds that instructional technology may be regarded as a subset of educational technology, focusing exclusively on teaching and learning applications and resources, overlooking the ones supporting administrative functions. Nevertheless, although it is acknowledged that the words educational and instructional have different connotations, it is quite common to treat the two terms as valid synonyms (Januszewski & Molenda, 2008).

2.1.2 Chronology of Technology in Education

Gutenberg’s invention of the printing press back in 1450 can be considered one of the earliest technology tools that empowered learning. The next milestone could be considered the first distance-learning course in secretarial shorthand, in 1840. Then, in the 1900s came the first audio recordings, followed by the arrival of radio stations in the 1920s and television in the 1930s. The 1960s brought satellites and ARPAnet, the ancestor of today’s Internet, with text-based databases and forums, while the 1980s gave birth to the fibre-optic technology along with the audio-visual / Compact Disc – Read Only Memory (CD-ROM). The 1990s brought the World Wide Web (WWW), and the 21st century gave birth to massive open online courses (MOOCs) and so on (Hofmann, 2006). This section will attempt to chart an updated

chronological timeline of the critical educational milestones that ensued as a result of technology integration in educational settings. As this case study is directly related to the integration of technology in education and how this is perceived by both educators and students, presenting such a timeline is considered necessary to demonstrate the evolution of technology integration over the years, along with the perceived lessons learnt from this integration.

Similar timelines have appeared in the work of many scholars, following various classifications to group the ‘eras’ of technology integration in education. Cuban (2001) adopts a simple yet effective grouping of ‘old’ and ‘new’ technologies. According to the scholar, old technologies refer to the traditional blackboard, textbooks, overhead projectors, television, and videocassettes, while new technologies include the latest innovations such as digital computers, peripherals, gadgets, networks and applications, along with any training these require for teaching professionals and any necessary technical supporting infrastructure. Howard and Mozejko (2015) group the historical periods in three ‘ages’: pre-digital, personal computer and the internet. Roblyer (2016) chooses to focus mainly on the digital period, dividing it into four eras, i.e. pre-microcomputer, micro-computer, the Internet, and mobile technologies. An interesting approach is followed by Ferster (2014), who proposes a classification based on the way technologies affect teaching and learning, generating five ‘genres’ of technologies sorted by chronological order. The first genre refers to technologies such as distance learning tools that attempted to reproduce the ‘Sage on the Stage’ practice, i.e. traditional learning experiences that resulted from the established face–to–face teaching

and textbooks. The second genre includes tools that supported programmed and automated instruction, such as teaching machines. The third genre focuses on the introduction of micro-computers and networks, which enabled richer interaction between the machine and the user; Ferster (2014) considers computer-based tutorials (CBTs) and applications using artificial intelligence (AI) as representative examples of this genre. The fourth genre refers to all Internet-based tools, including - but not limited to - learning/course management systems (LMS / CMS), MOOCs, interactive applications, simulations, content delivery, etc. Finally, the fifth genre includes future teaching machines, i.e. tools that have the potential of altering tomorrow's teaching and learning experience, such as natural language and semantic processing devices.

Given that the topic of this thesis focusses on the use of current, modern technologies, the classification adopted here draws from the above and forms two large groups, pre-digital and digital. The aim here is to demonstrate the evolution of education technology tools by presenting first the pre-digital ones, then concentrating on the digital tools, the use of which affects this case study. Moreover, it should be acknowledged that the chronology charted below serves as an indicative list of the critical milestones in education, mainly focusing on technology developments in the US, as this case study involves an institution that adopts American qualification standards.

2.1.2.1 Pre-digital Technologies

The timeline appearing in Table 2-1 charts the most important milestones in the history of educational technology in chronological order. Rather than focusing exclusively on the technological advances, the primary aim here is to identify the educational transformations resulting from these technological developments. Consequently, the presented chronology identifies the paradigms of technology integration in educational settings, along with any technology innovations that eventually led to critical changes in teaching and learning.

Time	Milestone
1450	Invention of the printing press by J. Gutenberg (Hofmann, 2006)
1467	Invention of the hornbook, “a leaf of written or printed paper pasted on a board, and covered with horn, for children to learn their letters, and to prevent their being torn or daubed” (Tuer, 1897, p.2). A typical hornbook contained the alphabet, the nine digits, and the Lord’s Prayer (Tuer, 1897)
1700s	Use of goose-quill pens with ink and paper or pieces of birch bark as an alternative of paper for poorer schools (Ferster, 2014)
	Use of textbooks (Ferster, 2014)
1783	Introduction of Noah Webster’s blue-backed spellers as instructional textbooks in the US (Ferster, 2014)
1809	Development of the first patent for an automated machine to teach reading (Ferster, 2014)
1813	Introduction of blackboards as whole-class presentation tools (Ferster, 2014)

Time	Milestone
1837	Presbyterian and school administrator W. H. McGuffey published at W. Smith a series of textbook readers (Ferster, 2014)
1840	Implementation of the first correspondence course, a secretarial shorthand teaching programme (Hofmann, 2006)
1866	Development of a spelling- teaching machine, the “Apparatus to Teach Spelling”, by H. Skinner, an inventor of carpet-making machines (Ferster, 2014)
1861	Invention of telegraph (Harasim, 2006)
1876	Invention of telephone (Harasim, 2006)
1878	Launching of the Chautauqua Literary and Scientific Circle (CLSC), the first successful implementation of distance learning in America (Ferster, 2014)
1891	Founding of the International Correspondence Schools (ICS) in Scranton, Pennsylvania by T. Foster, to train coal miners regarding safety procedures (Ferster, 2014)
Late 1890s	Use of film in schools (Howard & Mozejko, 2015)
1900s	Use of audio recordings in educational settings (Hofmann, 2006)
1910s	Use of motion picture projectors in school classrooms (Ferster, 2014)
1920s	Introduction of radio in primary, secondary and higher education institutions (Ferster, 2014; Hofmann, 2006; Howard & Mozejko, 2015)
1923	Founding of the Department of Visual Instruction, the predecessor of AECT, by the National Education Association (AECT, 2001)
1924	Psychologist S. Pressey introduced his “Machine for Intelligent Tests”, which was designed to automatically test the intelligence of a user (Ferster, 2014)

Time	Milestone
1927	Pressey created a model of the “Automatic Teacher”, an automated teaching machine designed to grade multiple-choice tests (Ferster, 2014)
1929	Manufacturing of “The Automatic Teacher” machine by M.W. Welch Manufacturing (Ferster, 2014)
1930s	Beginning of the audio-visual (AV) movement, including the use of television (Hofmann, 2006; Roblyer, 2016)
1939	World War II begins; to counter its effect in education, a national centre of distance education is founded in France (CNED, n.d.) Founding of The American Industrial Arts Association, the predecessor of today’s International Technology and Engineering Educators Association (ITEEA), whose purpose was to promote industrial arts study in schools. Their original aim expanded into promoting the study of technology and engineering (ITEEA, n.d.)
1948	W. W. Charters, a radio instructor innovator, was the first to indicate the term ‘educational technology’ (Roblyer, 2016; Saettler, 2004)
1950s	Australian universities start using computers for training in programming courses (Tatnall & Davey, 2014) The term ‘educational technology’ was used as a synonym to solutions to educational problems (Roblyer, 2016) Possible ineffectiveness of the use radio in education was documented in several research studies, which compared it against the traditional teaching mode (Ferster, 2014) Growth of both public and private investments regarding experimental use of television in schools and colleges in the US (Ferster, 2014)

Time	Milestone
1950	Rise of computers led to the first use of a computer for instructional purposes: a computerised flight simulator was used in MIT to train pilots (Roblyer, 2016) The first clicker device, the “Classroom Communicator”, is developed by C. R. Carpenter at Pennsylvania State University (Carpenter, 1950)
1951	Launching of the School of the Air programme, a distance education programme in Australia that utilised two-way radio (Howard & Mozejko, 2015)
1953	Behavioural psychologist and father of the operant conditioning theory B.F. Skinner created a prototype for his first teaching machine, which allowed a child to answer a question and immediately receive feedback (Ferster, 2014)
1956	Skinner created an improved version of his teaching machine (Ferster, 2014)
1957	The Soviet Union launched the first world’s artificial satellite, Sputnik I (NASA, 2007)
1958	Founding of the National Defence Education Act (NDEA), with main purpose to provide scientists with research opportunities (Ferster, 2014)
1959	Schools in New York City started using the IBM 650 computer to teach children binary arithmetic (Roblyer, 2016)
1960s	Universities started using time-sharing mainframe systems for programming and resource-sharing (Roblyer, 2016) Sputnik I was followed by the successful launching of more satellites (Ferster, 2014; Hofmann, 2006; NASA, 2007)

Time	Milestone
1962	By this time, more than 73 teaching machines were available. New teaching machines started focusing on the software aspect, and an assortment of educational programs were developed to support learning of various skills, such as languages, mathematics, science, and music (Ferster, 2014)
1963	Audiovisual specialist J. Finn became the first adopter of instructional technology (Roblyer, 2016)
1966	IBM 1500 instructional mainframe computer was manufactured to support computer-assisted instruction by connecting a central server to multiple multimedia learning stations (IBM, n.d.; Roblyer, 2016)
1967	Logo programming language is created by S. Papert ("Logo History," 2015; Roblyer, 2016)
1968	Ivan Sutherland develops a prototype stereoscopic head-mounted display, leading the way to modern virtual reality (Craig, 2013)
1969	Invention of ARPAnet, the ancestor of today's Internet (Harasim, 2006)

Table 2-1: Pre-digital Technologies

2.1.2.1.1 Educational Impact of Pre-digital Technologies

Norberg, Dziuban, and Moskal (2011) claim that the earliest technology qualifying as an educational innovation is the teaching space itself, as this emerged in ancient times progressing from personal tutoring/apprenticeship form to an organised setting with one teacher-master and multiple learners, utilising a designated time and space. Typical classes in universities in medieval times involved having the teacher read aloud ancient Greek

passages, followed by a general discussion. Texts were not easily accessible, and only wealthy students could afford media that could be used for taking notes. The overall teaching and learning process was limited to synchronous time and space. It was Gutenberg's invention of the printing press back in the 15th century that radically changed the educational scenery, as texts became available to a wider audience. Traditional lecturing blended with books can be considered as the earliest example of blending learning, as it was at last possible for a person to learn in an asynchronous time and space, without necessarily requiring the presence of a teacher while studying (Norberg *et al*., 2011). A few years after Gutenberg's printing press, another significant invention came about; the hornbook of the 15th century is considered as one of the first technologies integrating content knowledge with instructional techniques (Ferster, 2014; Tuer, 1897).

Moving on to the 18th century technologies, it is important to point out that these were generally designed to facilitate students, rather than instructors. The most common technology was the established set of goose-quill pens, ink and paper, yet it was not so effective. The complexity of their use resulted in hiring teachers based on their technical skills with pens and ink instead of their teaching ability. Textbooks, "the principal delivery mechanism of human thought up through the present day" (Ferster, 2014, p.3), were introduced at the time as a question-and-answer technique that imitated the traditional teaching method, and they were one of the first implementations of 'teacher proofing', i.e. the practice of generating more consistent and uniform teaching by restricting the autonomy of individual instructors. Noah's blue-backed

spellers, which included rules for spelling and pronunciation, along with general learning tips, became the first popular instructional textbooks of the time (Ferster, 2014).

The 19th century technologies became more instructor-centred. The first blackboards were essentially the ancestors of today's more sophisticated interactive whiteboards and digital projectors, designed to facilitate the instructor in presenting the material to be taught in an efficient manner. On par with Webster's blue-backed spellers, McGuffey's readers became very popular with educators. They are considered among the first attempts at standardised textbooks to be used across different schools – even by home-schooling parents. Moreover, H. Skinner's "Apparatus to Teach Spelling" appeared to be a quite promising tool, enabling students to choose letters to spell out a given picture; however, its main weakness was that it did not provide direct feedback confirming a correct response (Benjamin, 1988; Ferster, 2014).

Towards the end of the 19th century, higher education was still a privilege that only a few people could afford. As more and more people were keen in becoming educated, an increased interest for alternative, informal educational settings arose. The Chautauqua Literary and Scientific Circle (CLSC) was the first successful case of distance learning in America, where the participants would meet once, and instructors would assign a set of questions from specific books. The students were then expected to study on their own for the rest of the year, then send written answers to the assigned questions to the

instructors via the postal system. The instructors would then return written feedback on these answers by mail. The CLSC was followed by the founding of the International Correspondence Schools (ICS), the largest and most successful case of American distance education at the time (Ferster, 2014).

At approximately the same time, some schools attempted to use newly invented film for educational purposes. Nevertheless, film, as a technology, was not designed specifically to be used in educational environments. Despite the original excitement, its use did not yield the expected upgrading in teaching and learning (Howard & Mozejko, 2015).

The early 20th century continued along the same lines with more provoking technological advancements. The new trend of industrialisation called for enhanced productivity and efficiency, so the need for educational changes supporting these emerged. Education started attracting the attention of governments in many countries, and funding schools became a priority. As the number of students increased, so did the need for technologies and strategies that would enable instructors to efficiently and effectively reach large audiences at once (Howard & Mozejko, 2015).

The instability caused by World War II also affected the educational system, as students were prevented from accessing their schools; distance learning education appeared to be an effective method to overcome this problem. As a result, a national centre for distance education was formed in France, which eventually evolved into the largest distance learning institution in Europe; this centre changed multiple titles before becoming today's Centre National

d’Enseignement à Distance (CNED) (CNED, n.d.; West, 1999). Addressing the above, the introduction of radio and later of television into schools followed the one of film as mentioned before, but, likewise, the presumed revolution did not occur. A common feature between these technologies was that they employed video and/or audio channels to deliver information to students; therefore, all three technologies shared the deficiency that instructors thought they could simply integrate these into their existing teaching practices, so eventually these technologies were utilised in a different way than expected. Regarding radio in particular, instructors attempted to use it by merely teaching via a microphone, and not all of them had the required broadcasting skills (Ferster, 2014; Howard & Mozejko, 2015). Moreover, a critical weakness of radio was that it relied on a single sense, while in the traditional face–to-face educational setting, learning was the result of not just sound, but also of body and face gestures, as well as writing on the board (Ferster, 2014). Moving on to television, its combination of media was supposed to offer a very realistic experience, simulating the traditional educational setting of a teacher lecturing. Educational film, radio and television all offered a pledged economy of scale, as, similar to today’s MOOCs, one episode of these had a fixed production cost but it could be re-used over and over, so compared to traditional live classrooms the overall cost was significantly lowered (Ferster, 2014). Thomas Edison, the inventor of motion picture, during a newspaper interview declared that “The motion picture is the great educator of the poorer people” (Smith, 1913, p.24). In the same interview, Edison expressed his optimism regarding the potential

prospects of educational film stating that “Books… will soon be obsolete in the public schools. Scholars will be instructed through the eye. It is possible to teach every branch of human knowledge with the motion picture. Our school system will be completely changed inside of ten years”. Edison was not the only one placing so much faith in the new technologies; his enthusiasm was shared by many educators endorsing behaviourism and objectivism who maintained that it was possible for comprehensive learning to occur exclusively via these technologies (Saettler, 2004; Selwyn, 2011). Higher education professors advocated in favour of the superiority of audio-visual media (slides, films, audio) over traditional ones (lectures and textbooks) in relation to delivery of information (Roblyer, 2016). From the 1920s until the early 1980s, the emphasis shifted from instructors to technology-enabled external information sources, and subsequently, educational technology automatically implied the use of audio-visual tools for preparing material with the intention of presenting it to a class via continuously evolving projecting devices such as slide projectors, film projectors, and eventually television systems (Ferster, 2014; Saettler, 2004).

Nevertheless, although film, radio and television did provide a broader variety of re-usable resources that enriched and enhanced the overall educational experience, research brought no evidence of any remarkable improvement of learning compared to traditional educational approaches. Sadly, failing to meet expectations is not uncommon throughout the history of educational technology; usually, instructors and educational institutions were the first to be blamed (Howard & Mozejko, 2015).

Following the general trend of reducing time in facilitating teachers and improving their productivity and efficiency, attempts were also made to create teaching machines, aiming at automating tasks such as correcting and grading tests and therefore relieving instructors from tedious, repetitive labours. Benjamin (1988, p.704) maintains that among a plethora of definitions a widely-adopted one states that “A teaching machine is an automatic or self-controlling device that (a) presents a unit of information […], (b) provides some means for the learner to respond to the information, and (c) provides feedback about the correctness of the learner’s responses”. Contrastingly, Ferster (2014, p.17) defines a teaching machine as “a way to deliver instruction by using technology that marries content and pedagogy into a self- directed experience for a learner and which relies on minimal assistance from a live instructor”. It can be seen that Ferster’s definition focuses on delivery rather than interaction, while Benjamin considers interaction and feedback to be critical elements of a teaching machine.

Pressey’s “Automatic Teacher”, originally designed to test the intelligence of users, eventually became a teaching machine. Although it seemed quite promising at first, technical issues prevented instructors from effectively utilising it, and in the end only 127 units were sold (Ferster, 2014). B.F. Skinner suggested that this failure happened simply because time was not yet ripe, as his own teaching machines that he invented later were immediately adopted and successfully used by natural sciences Harvard students (Ferster, 2014).

During the 1950s, the educational landscape changed even more. A growing interest in accommodating individual differences was accompanied by the development of tools that supplemented the textbook and automated the grading process, such as Skinner's teaching machines (Black, 1967; Ferster, 2014). Most importantly, the development of computers prompted teaching professionals to realise the potential of utilising these in education (Roblyer, 2016). At the same time, positive effect of the use of two-way radio in distance education was acknowledged, as it enabled direct feedback and interaction (Howard & Mozejko, 2015).

In the 1950s, Australian universities began using computers in education for the first time, within the context of computer programming courses (Tatnall & Davey, 2014). In the late 1950s, the successful launching of the world's first artificial satellite (Sputnik I) by Russia acted as a wake-up call for the US, triggering a series of reactions. The US administration attributed the Russian achievement to the superiority of Russian education, so the need to upgrade the overall US educational system felt imminent, and educational technology was advocated as a potential saviour for this. In 1958, in addition to the National Aeronautics and Space Administration (NASA), the National Defence Education Act (NDEA) was formed and it immediately started promoting research and experimentation on the use of technology aids such as audio-visual tools to enrich the existing pedagogy of teaching and learning (Ferster, 2014; NASA, 2007). The creation of IBM 650, the first computer to be used with schoolchildren, marked the end of the 1950s (Roblyer, 2016).

The next decade brought the birth of ‘educational computing’. Educators started adopting instructional technology, following the example of the audio-visual expert James Finn (Roblyer, 2016). IBM pioneered once more with IBM 1500, the first instructional mainframe computer with multimedia learning stations. Instantly adopted by numerous universities, IBM 1500 was used for the development of many computer-assisted instruction (CAI) resources. Some of these CAI systems, such as the Programmed Logic for Automatic Teaching Operations (PLATO) system became extremely popular. The wide adoption of IBM’s mainframe gave rise to university time-sharing systems that provided programming and other shared utilities to instructors and students of multiple universities (Roblyer, 2016). Furthermore, multiple teaching machines emerged, along with respective manufacturing companies, such as TMI - Teaching Machines Incorporated (Ferster, 2014; “The Teaching Machines”, 1960). Nevertheless, within the context of the general trend towards improving the educational system of the time, extensive research analysing its inefficiencies was conducted by psychologists. As a result, teaching machines such as the ones produced by Skinner and his pupils received a lot of criticism, as studies proved that they were neither more efficient nor more effective when compared with traditional teaching methods (Ferster, 2014; Morrill, 1961).

Sutherland’s stereoscopic head-mounted display, created in 1968, enabling users to immerse into a virtual world, opened a new world of educational opportunities for simulated training (Craig, 2013). The end of the 1960s gave birth to ARPAnet (Harasim, 2006), and the pre-World Wide Web Internet

emerged, initially in the form of discussion forums and text-based databases (Roblyer, 2016).

2.1.2.2 Digital Technologies

Table 2-2 summarises the digital technological milestones that affected the educational landscape from the 1970s until the present (2019).

Time	Milestone
1970s	Introduction of personal computers (PCs). Development of educational software and of computer-assisted instruction (CAI) in Europe, US and Australia (Howard & Mozejko, 2015; Roblyer, 2016; Selwyn, 2011; Tatnall & Davey, 2014).
1971	First computer teleconferencing system, Emergency Management Information System and Reference Index (EMISARI), was developed by Murray Turoff for the US Office of Emergency Preparedness Invention of e-mail (Harasim, 2006; Hardy, 1996)
1972	Conception of Dynabook, a handheld computer intended to be used by children as a learning device (Kay, 1972)
1973	PLANET computer teleconferencing system (Harasim, 2006; Hardy, 1996) Development of the first mobile telephone, Motorola DynaTAC 8000X (Crompton, 2013)
1975	Electronic Information Exchange System (EIES) computer teleconferencing system for scientific research communities (Harasim, 2006; Hardy, 1996)

Time	Milestone
1977	First use of desktop microcomputers in schools (Roblyer, 2016)
1979	Founding of International Society for Technology in Education (ISTE) (ISTE, n.d.)
1980s	‘Networked Classroom’ new modality of learning. Online courses based on online collaborative learning (OCL) (Harasim, 2006) Invention of fibre optics and audio-visual technologies such as CD-ROM (Hofmann, 2006) Integrated Learning Systems (Roblyer, 2016) Development of multiple commercial handheld computers (Crompton, 2013)
1981	First totally online courses for informal training of business executives (Harasim, 2006)
1982	First online programme in executive education (Harasim, 2006)
1983	Networked Classroom Model for primary and secondary schools. Examples: ICLN, RAPPI (Harasim, 2006) Motorola’s mobile telephone becomes commercially available (Crompton, 2013)
1984	Technology, Education, Design (TED) media company is founded (TED Conferences, 2018)

Time	Milestone
1985	Apple Classrooms of Tomorrow (ACOT) project (Howard & Mozejko, 2015) First purely online graduate courses, such as Connect-Ed at the New School of Social Research and OISE at the University of Toronto First totally online labour education network, such as Solinet in Canada (Harasim, 2006)
1986	First purely online undergraduate course and undergraduate degree programme (Harasim, 2006)
1987	Lanier, founder of the company VPL, coined the term “Virtual Reality” (Craig, 2013)
1989	Launching of the Internet First large-scale online courses Term “Computer Supported Collaborative Learning” (CSCL) is coined (Harasim, 2006) Invention of the WWW by Tim Berners-Lee at the Centre for European Nuclear Research (CERN) in Switzerland (CERN, 2018)
1990	Launching of FirstClass, the first LMS for MacIntosh computers by SoftArc (Oxagile, 2018) “Augmented Reality”, i.e. augmenting real life scenes with computer-generated objects, is introduced as a term by Tom Caudell, a Boeing researcher (Roblyer, 2016)
1991	First interactive whiteboard is created by SMART technologies (Firmin & Genesi, 2013; SMART Technologies, 2018)

Time	Milestone
1993	WWW is made available to the public Development of Mosaic, the first web browser software First National Educational Networks such as SchoolNet in Canada (CERN, 2018; Harasim, 2006; Roblyer, 2016) Release of the Newton personal digital assistant (PDA) by Apple (Kho, Henderson, Dressler, & Kripalani, 2006)
1994	Creation of the first Wiki site by Ward Cunningham (Leuf & Cunningham, 2001) The Bluetooth wireless networking standard is conceived by J. Haartsen at Ericsson (Triggs, 2018)
1995	Beginning of virtual lessons (Roblyer, 2016)
1996	First large-scale online education field trials, such as the Virtual-U Research project (Harasim, 2006) Release of the PalmPilot 1000 PDA (Kho *et al*., 2006)
1997	Launching of Blackboard LMS (Bradford, Porciello, Balkon, & Backus, 2007) Development of the “Interactive Learning Network” by CourseInfo (Oxagile, 2018) Development of the 802.11 wireless network standard by the Institute of Electrical and Electronics Engineers (IEEE), later renamed as Wi-Fi (Gregersen, 2017)
1998	Founding of the Open Source Initiative (OSI) (Bretthauer, 2001; “History of the OSI | Open Source Initiative”, 2012) ISTE creates the first National Educational Technology Standards (NETS) for technology skills of students, instructors, and administrators (Roblyer, 2016)

Time	Milestone
1999	Establishment of the Sloan Consortium of Colleges and Universities (Sloan-C), a professional online learning society (Harasim, 2006; Online Learning Consortium, 2018) Launching of the first consumer Bluetooth hands-free mobile headset (Triggs, 2018)
Late 1990s – early 2000s	Web 2.0. Information Superhighway Weblogs and free 'build-your-own-weblog' tools (O' Reilly & Battelle, 2009; Roblyer, 2016) Advent of high-speed broadband networks (Warner, 2018) Dawn of mobile learning (Sharples, Taylor, & Vavoula, 2006)
2001	Passing of No Child Left Behind (NCLB) Act (Firmin & Genesi, 2013) OpenCourseWare (OCW) initiative. MIT made video-lectures and other academic content from various classes freely available on the Internet (Ferster, 2014; MIT, 2018) First Bluetooth telephone becomes commercially available (Triggs, 2018)
2002	Founding of the 'Partnership for 21st Century Learning' (P21) (P21, n.d.; Roblyer, 2016) Founding of the New Media Consortium (NMC) Horizon Project, aiming to provide educators with expert research and analysis (NMC, n.d.; Roblyer, 2016) Launching of Moodle, the first open-source LMS (Moodle, 2018; Oxagile, 2018)

Time	Milestone
2004	Founding of Facebook social networking site (Facebook, n.d.) Development of SCORM 2004 (Shareable Content Object Reference Model), a set of standards for LMSs (Oxagile, 2018)
2005	One Laptop Per Child (OLPC) initiative (Howard & Mozejko, 2015) Founding of YouTube, a provider of freely available video via the Internet (Ferster, 2014; Soukup, 2014)
2007	Creation of the first Kindle e-book reader by Amazon (Roblyer, 2016) Launching of the iTunesU educational platform by Apple Computer in collaboration with Duke, Yale, MIT, Berkeley, and Stanford (Ferster, 2014) Apple launches the first iPhone (Islam & Want, 2014)
2008	Creation of Information and Communication Technology (ICT) frameworks by P21 and UNESCO for the skills required by students and teachers (Roblyer, 2016; UNESCO, CISCO, INTEL, ISTE, & Microsoft, 2011) Launching of the first Massive Open Online Course (MOOC), “Connectivism and Connectivity Knowledge” by the University of Manitoba, Canada (J. S. Daniel, 2012; Sandeen, 2013)
2010	Release of the first iPad handheld computer by Apple (Roblyer, 2016)
2011	Launching of the first US-based MOOC, “Online Learning Today and Tomorrow”, by the University of Illinois, Springfield (Sandeen, 2013)

Table 2-2: Digital Technologies

2.1.2.2.1 Educational Impact of Digital Technologies

The introduction of microcomputers and the first computer teleconferencing systems in the 1970s set in motion the educational digital revolution and the computer-assisted instruction movement emerged (Roblyer, 2016). New affordable PCs seemed quite promising to educational institutions, which, following the general governmental recommendation, started investing in PCs and in the plethora of educational software that flooded the market. At the time, the educational value of reaching more students started being viewed as equally important to productivity, efficiency, and ability of measuring learning outcomes, and computers appeared ideal for delivering these. Motorola designed the first mobile telephone, and although it took a decade to become commercially available, it set the ground for the next century's mobile learning modality (Crompton, 2013). Meanwhile, workplace needs started evolving; the need for manual labour gradually began to decrease while a demand for problem-solving and critical skills rose, and computer literacy was identified as a budding catalytic agent for these (Goodman, 1995; Howard & Mozejko, 2015; Saettler, 2004; Selwyn, 2011). In addition, computers seemed perfectly capable of supporting personalised education for students, by tailoring learning to each student's needs (Howard & Mozejko, 2015; Suppes, 1966). As a result, schools were expected to deliver computer literacy skills such as programming and use of basic software, a requirement which prioritised the need for student access to computers, hence the 'student-to-computer' ratio became a decisive quality evaluation criterion for educational institutions (Cuban, 2001; Howard & Mozejko, 2015; Roblyer, 2016). In addition, the

invention of e-mail and the new ground-breaking computer teleconferencing systems such as EMISARI, PLANET, and EIES transformed computer mediated communication (CMC), enabling the use of the net to support both traditional face–to–face and distance education; a new enhanced mode of e-learning was born, as these systems allowed real-time message exchange (Harasim, 2006; Hardy, 1996). Once more, the expectations for positive learning benefits of computer use were high, as it was assumed that the use of computer-based instruction would automatically guarantee personalised education for students (Howard & Mozejko, 2015).

Following these transformations, the 1980s brought about the new ‘Networked Classroom’ learning modality, promoting the use of computer networks as a pedagogical facilitator and rendering online collaborative learning (OCL) as the key component of a blooming plethora of e-learning courses (Harasim, 2006). Educational institutions gradually moved away from microcomputers and towards networking systems, a shift that prompted the development of integrated learning systems (ILSs), i.e. systems with built-in (often extensive) curriculum that could be used by multiple educational institutions (Roblyer, 2016). A prevailing belief at the time was that all students should have unlimited access to the new technologies, as the latter seemed capable of being adapted to each student’s personalised needs and learning approach. This potential for personalisation and customisation was aligned with an evolution in learning theories through the emergence of cognitivism and constructivism; these paradigms advocated that learning should no longer be viewed as a purely behaviouristic process, shaped exclusively by selective

reinforcement of the desired behaviour. Rather, the role of the individual learner's mind should be acknowledged, as a perceiver and interpreter of external stimuli; therefore, each learner constructs their own, personalised learning (Jonassen, 1991; Papert, 1980). Influenced by the principles of constructivism learning theories, initiatives such as the One Laptop Per Child (OLPC) and the Apple Classrooms of Tomorrow (ACOT) emerged, advocating a shift from the conventional teacher-centred pedagogical model, where students received information from their instructors in the form of lectures and text, towards a more student-centred one, where technology becomes an enabler for students to work towards self- and peer-learning (Cuban, 2001; Howard & Mozejko, 2015; Papert, 1980; Sandholtz, Ringstaff, & Dwyer, 1997).

The introduction of the Logo programming language by Seymour Papert reinforced this view, as Logo was designed to be used as a problem-solving teaching tool; computers gradually became regarded not as mere tools, but rather as aids for critical thinking and problem-solving (Papert, 1980; Roblyer, 2016). This move, along with the continuously increasing range of teaching and learning tools, resulted in evolved computer literacy skills; computers now offered electronic reference materials, teacher-authoring software, word processors, spreadsheets, database management tools, computer aided design (CAD), games, tutoring programs, etc. Computer supported collaborative learning (CSCL) became a valid coined term, addressing mainly the social aspects of collaborative learning via technology (Parchoma, 2011; Stahl & Hesse, 2006; Stahl, Koschmann, & Suthers, 2006); CSCL is

discussed further in section 4.1.2.7. Organisations such as Technology, Education, Design (TED) were founded, promoting the use of digital tools in education (Howard & Mozejko, 2015; Roblyer, 2016; TED Conferences, 2018). The first purely online graduate and undergraduate courses were implemented, not without problems, but overall successfully. The launching of the Internet and the WWW before the end of the 1980s enabled the materialisation of large-scale online courses and complete degrees (CERN, 2018; Harasim, 2006). Around the same time, an Air Force simulation project gave the opportunity to US pilots to be trained by immersion in a virtual, but seemingly real, computer-generated environment; in 1987, Lanier coined the term virtual reality (VR), as his company started developing VR gear (Craig, 2013).

As technology was steadily becoming validated as an invaluable educational asset, the pressure for educational institutions and instructors to adopt and utilise digital tools proportionally increased. Educators who did not employ such tools to the maximum possible extent were blamed for disadvantaging students, and the first glimpse of a ‘digital divide’ surfaced; institutions in lower socio-economic regions could not afford to cater for the emerging technology needs either of their students or of their instructors, and it became apparent that the use of technology could disadvantage those students and instructors (Cuban, 2001; Howard & Mozejko, 2015).

Educational innovations continued in the 1990s with the expansion of e-learning and computer networking in all levels and fields of education. As the

popularity of the Internet increased, e-learning forms evolved; in addition to the already-established online collaborative learning (OCL), online distance education (ODE) and online computer-based training (OCBT) emerged (Harasim, 2006). The term ‘educational technology’ was coined, referring to instructional systems, media, and computer based systems (Roblyer, 2016). The WWW became available to the public, and the Internet resources seemed limitless; they could be hyperlinked, they provided information and knowledge from all over the world, and they allowed people to communicate mainly via text, through e-mail, online chatting and forums, giving rise to the Information Superhighway (Dillon & Gabbard, 1998; Howard & Mozejko, 2015; Roblyer, 2016). Later, the idea of augmented reality was born, suggesting the overlaying of information and virtual objects with real-life scenes (Roblyer, 2016). The landscape of classroom learning changed even more by the development of the first interactive white boards (IWBs) by SMART technologies (Firmin & Genesi, 2013; SMART Technologies, 2018), and also by the launching of the first LMSs such as FirstClass and Blackboard (Bradford *et al*., 2007; Oxagile, 2018). In the mid-1990s the use of Internet in education widened dramatically, virtual classrooms thrived, and mixed (blended) modes of e-learning emerged, integrating digital technologies with the traditional classroom (Harasim, 2006; Roblyer, 2016). Moreover, the gradual but steady evolution of mobile devices and wireless standards such as Wi-Fi and Bluetooth laid the ground for the pioneering mobile learning modality that would rise in the twenty-first century (see section 4.1.2.8 for further discussion of mobile learning). Although the Apple Newton released in

1993 did not receive the forecasted popularity, the Palm PDA that was released a few years later was the first handheld device that could be employed as an educational aid (Crompton, 2013; Kho *et al*., 2006).

The introduction of the first wiki pages, intending to promote content sharing and collaborative editing, mark the gradual shift from static web content to interactive, collaborative web sites, and prepare the ground for Web 2.0, the second generation of the WWW (Leuf & Cunningham, 2001; O'Neill, 2005; Ruth & Houghton, 2009).

By the end of the 1990s the Internet was fully used by numerous educational institutions, in primary, secondary and higher education in many areas of the world. The first standards for the use of technology in education, the National Educational Technology Standards (NETS) was developed by the International Society for Technology in Education (ISTE) (Roblyer, 2016), and organisations promoting online learning such as Sloan-C were founded (Harasim, 2006; Online Learning Consortium, 2018). The launching of the Open Source Initiative (OSI) contributed to the unrestricted availability of much-needed digital resources to the educational community, while promoting worldwide collaborative input (Bretthauer, 2001; Harasim, 2006; "History of the OSI | Open Source Initiative", 2012). Nevertheless, the digital divide persisted, though in a different form; although students of lower social and economic classes had eventually more access to technology compared to previous years, it seems that the benefit of appropriate training for effectively using these resources to their full potential was a privilege of the higher social

classes only. Eventually, the digital divide not only was not lessened, but it was rather intensified in its new shape. Some scholars claim that the uncontrolled and unguided access to technology appeared to be the cause of one more disadvantage for unprivileged students, as it seemed that they primarily used the new tools for non-educational activities, which proved to be associated with lower academic performance (Howard & Mozejko, 2015; Roblyer, 2016; Vigdor, Ladd, & Martinez, 2014). Initiatives such as the 2001 NCLB Act in the US attempted to reduce the digital divide by establishing provisions for disadvantaged students (Firmin & Genesi, 2013).

Despite the above challenge, the rapid technological advancements leading the way to the 21st century's 'Information Age' also gave rise to a considerable paradigm shift in education. These changes in the educational scenery had a reciprocal effect on the world of technology, and researchers in the area of human computer interaction (HCI) started exploring user interface designs that could support the new educational paradigm shift: "the HCI community must make another transition: we must move from 'user-centered' design to 'learner-centered' design" (Soloway, Guzdial, & Hay, 1994, p.38). The dawn of the new century unfolded, revealing not only novel technological affordances but also pioneering pedagogical models for teaching and learning, with the very nature of learning in some cases being transformed by the new ground-breaking innovations in digital tools and online resources. In the early 2000s, the growth of the Internet and the WWW was exponential, as the meaning of the term 'online' evolved from using a computer, to being connected to the Internet. Websites became dynamic, allowing users to not

only interact with each other but also personalise their online experience by changing and creating their own online content. Broadband high-speed networks enabled streaming of audio and video (Warner, 2018). The popularity of the latest networked resources, such as e-mail, wikis, web-based multimedia, videoconferencing, weblogs and most importantly the first social networking platforms like Facebook, heightened the already increased online social interaction (Harasim, 2006; Howard & Mozejko, 2015; O' Reilly & Battelle, 2009; Roblyer, 2016; Voogt & Knezek, 2008). This second generation of the WWW, also called Web 2.0 or Web squared, promoted an even wider adoption of world-wide networked e-learning; "Web 2.0 is all about harnessing collective intelligence" (O'Reilly & Battelle, 2009, p.1). Online tools gradually came to be part of the established instructional delivery at all education levels, while the WWW became one of the fundamental communication media for educators (Roblyer, 2016). The use of IWBs and of LMSs increased. The Massachusetts Institute of Technology (MIT) set a bold example that was soon followed by other universities, enhancing their online presence by making core academic course material freely available via the Internet, therefore leading the way towards the OpenCourseWare (OCW) initiative (MIT, 2018). This prompted the development of multiple Internet-based educational media and platforms, such as Apple's iTunes U, which aimed to facilitate universities reaching their students via the already popular iTunes music program. A few years later, the educational material that was shared online was not limited to audio only, as educators started using the

YouTube video-sharing platform (Ferster, 2014; Soukup, 2014). Eventually, the first MOOCs emerged (Bates, 2014; J.S. Daniel, 2012; Sandeen, 2013).

Following the evolution of the Internet and the WWW, a diverse assortment of new technologies emerged, including cloud computing, Artificial Intelligence (AI), gesture-based computing, e-book readers, and, most importantly, ubiquitous mobile computing. The ease of access to online resources was dramatically facilitated by the new wireless, mobile devices such as tablets and smartphones, boosting the adoption of distance learning by all education levels to spectacular levels (Howard & Mozejko, 2015; Roblyer, 2016).

Being able to understand how to use computers was prioritised as a basic social skill, equally important to literacy and numeracy, requiring critical and analytic thinking. Consequently, educators realised that the new 21st century technologies appeared quite promising for cultivating higher order thinking for students, and later studies showed that technology integration might indeed improve learning (Howard & Mozejko, 2015; Tamim, Bernard, Borokhovski, Abrami, & Schmid, 2011). As computer literacy skills were once more redefined and expanded, instructors yet again struggled to stay updated and appropriately utilise the plethora of the new tools, while guidelines and frameworks were developed to identify and review these skills, such as the "Partnership for 21st Century Learning" (P21) and UNESCO's Information and Communication Technology (ICT) competency framework for teachers (Howard & Mozejko, 2015; Roblyer, 2016; UNESCO *et al*., 2011).

Concluding this section, it can be clearly seen that all the aforementioned advances in technology had - and still do have - a significant impact on the educational setting, shaping pedagogy and practices that are sometimes referred to as ‘new’ ways of teaching and learning, with the prevailing ones being e-learning, online learning, and blended learning (Passey, 2019). These three learning modalities are presented in the next section, with greater emphasis on blended learning, as this is the main focus of this thesis.

Chapter 3 'New' Ways of Teaching and Learning

3.1 E-learning

The origins of e-learning, the shortened form of 'electronic learning', can be traced back to the 1990s, although there is no concrete evidence regarding the first use of the term (J.L. Moore, Dickson-Deane, & Galyen, 2011). Nevertheless, since then, e-learning has evolved into a learning pedagogy, encompassing a set of educational and research practices which integrate digital and networking technologies with elements from the fields of education, educational psychology, instructional design, and distance education (Friesen, 2009; Sangrà, Vlachopoulos, & Cabrera, 2012). The interdisciplinary nature of e-learning is an attribute shared with some of its founding fields of practice and research, such as distance education and educational technology, as these also draw from both technology and education domains (Friesen, 2009). Distance education in particular seems to have a special relationship with e-learning; in earlier studies, e-learning was considered to be none other than distance learning's latest version (e.g. Garrison, 1997). Nevertheless, more recent research has acknowledged that the two terms are not equivalent, so e-learning has received the accreditation of a distinct modern generation of the lineage of educational systems, in which distance learning stands out as one of the most prominent and wise ancestors (Garrison, 2011; Guri-Rosenblit, 2005; Sangrà *et al*., 2012).

With the evolution of technology, the popularity and applicability of e-learning has increased, prompting educators to associate this 'new' way of learning to

specific learning theories, in order to better comprehend and therefore harness its power and use. Clark and Mayer (2011) choose to unravel e-learning from the perspective of how the use of e-learning's multimedia technologies affect cognitive processing; they relate this to individual learning theories that focus on the significance of psychological engagement as a requirement for successful learning - a requirement that, according to the scholars, can be effectively stimulated during the interaction between the learner and the multimedia interfaces utilised within a carefully designed e-learning context. This characterisation of e-learning as predominantly individual appears to come into conflict with the communal nature that other researchers associate with e-learning; for instance, according to Garrison (2011, p.2), the primary goal of e-learning is "to create a community of inquiry independent of time and location through the use of information and communications technology", which can be achieved "using the possibilities of new and emerging technologies to build collaborative constructivist learning communities". Nevertheless, Friesen (2009) argues that this contradiction regarding the individual or communal nature of e-learning lies in the eye of the beholder; he supports that a dual nature seems to be the case for e-learning, so describing the one or the other is simply a matter of perspective - similar to describing the two sides of the same coin.

Over the years, a plethora of definitions of e-learning have emerged; nevertheless, not all definitions were in agreement, and considerable inconsistencies are evident. Moreover, in some cases, other popular terms have been inaccurately used as synonyms to e-learning, including virtual

learning, online learning, computer-based training/learning, and technology-based training/learning (Friesen, 2009; Mason & Rennie, 2006; J.L. Moore *et al*., 2011; Passey, 2019; Sangrà *et al*., 2012; Watson, 2005; Watson, Gemin, & Ryan, 2008). Some scholars have drawn attention to the need to establish a common frame that would generate a universally adopted definition for e-learning, aiming to reduce the chaotic misconceptions around e-learning research and practices (e.g. Rossiter, 2007; Sangrà *et al*., 2012). Attempting to develop a universal definition for concepts that appear to have more than one meaning is not uncommon in the educational scientific community - on the contrary, there are numerous studies sharing this goal, concerning various educational concepts, such as distance learning (Garrison & Shale, 1987; Keegan, 1980), blended learning (see section 3.3), etc.

Sangrà *et al.* (2012) explored the various e-learning definitions that emerged after 2005. The researchers grouped these according to the attributes of e-learning on which emphasis was placed, and they eventually came up with four categories. The first one, titled “technology-driven” (Sangrà *et al*., 2012, p.148), includes definitions that focus on the technological nature of e-learning, describing e-learning primarily as the use of technology with the purpose of assisting learning; an illustrative example in this category is “the use of electronic media for a variety of learning purposes that range from add-on functions in conventional classrooms to full substitution for the face-to-face meetings by online encounters” (Guri-Rosenblit, 2005, p.469). The second category, “delivery-system-oriented” (Sangrà *et al*., 2012, p.148), refers to definitions in which e-learning appears to be a method that facilitates access

to knowledge, with the effects of this access taking a secondary role; two representative definitions here are “E-learning is the delivery of education (all activities relevant to instructing, teaching, and learning) through various electronic media” (Koohang & Harman, 2005, p.77) and “e-Learning is a technology supported learning method… which allows students to learn at any time and place under the assistance of communication and multimedia technologies” (Li, Lau, & Dharmendran, 2009, p.235). The third category, labelled “communication-oriented” (Sangrà *et al*., 2012, p.148), comprises mainly definitions from academic and communication fields, with the leading role being attributed to the communication/collaboration aspect of e-learning. A representative definition of this category is the following:

> E-learning can be defined as learning through the use of digital material on the Internet… It is based on three principles 1) It is networked. 2) It is delivered using standard Internet technology. 3) It is focused on the broadest view of learning, beyond the teacher-centered paradigm, and gives increased emphasis to informal and on-demand learning. (Bermejo, 2005, p.141)

Finally, the fourth category includes the “educational-paradigm-oriented” (Sangrà *et al*., 2012, p.148) definitions, which present e-learning as a new and improved learning paradigm; indicative definitions here are “e-learning is defined as information and communication technologies used to support students improve their learning” (Ellis, Ginns, & Piggott, 2009, p.304) and

"how institutions can enhance learning, teaching and assessment using appropriate technology" (HEFCE, 2009, p.1).

Taking into consideration the core characteristics of all four categories, Sangrà *et al.* (2012, p.152) suggest the following definition:

> an approach to teaching and learning, representing all or part of the educational model applied, that is based on the use of electronic media and devices as tools for improving access to training, communication and interaction and that facilitates the adoption of new ways of understanding and developing learning

Interestingly, Passey (2019), acknowledging that the above definition by Sangrà *et al.* (2012) seems quite comprehensive and all-inclusive, points out that there is a potential limitation that it shares with most other definitions available in literature; it essentially focuses on e-learning's provisions of electronic resources, and not on potential concerns regarding teaching and learning pedagogy.

3.2 Online Learning

Online learning appears to have a long history, with some scholars tracing its roots back to computer-assisted instruction (CAI) of the 1960s (Gemin & Pape, 2017), while others acknowledge the origins of online learning in the 1980s (Harasim, 2000; J.L. Moore *et al*., 2011). Regardless of this chronological difference, scholars seem to agree on associating the increased popularity and applicability of online learning with the expanded use of the

Internet and its resources, and in particular of the multimedia-friendly World Wide Web (Gemin & Pape, 2017; Harasim, 2000). Nevertheless, some scholars consider online learning as nothing more than a new and improved form of distance learning (Benson, 2002; Conrad, 2002; Gemin & Pape, 2017; Harasim, 2000; Hiltz & Turoff, 2005), while others do not share this view, arguing that, although the two learning forms are undoubtedly related, online learning, similarly to e-learning, should be viewed as a distinct form of learning with a set of discrete features that discerns it from distance learning (Garrison, 2011; J.L. Moore *et al*., 2011). To illustrate such a distinct feature that differentiates the two learning forms is the design methodology that determines the availability of the learning elements - being programmes, courses, modules, or learning objects; this design methodology can be either instructor-directed, self-paced, or self-directed (J.L. Moore *et al*., 2011). According to Rhode (2009), traditional classroom settings are representative of the instructor-directed methodology, which is regarded as the least flexible as far as the learners are concerned; learners are required to follow the learning order and pace set by an instructor, and all learners are expected to carry out the same activities, at the indicated times. Contrastingly, the self-paced methodology gives more autonomy to the learners, as they can control time, pace, and location of their learning experience; online learning is therefore perceived as employing this form of design, providing learners the freedom of completing the assigned activities via the Internet, at any time suitable to them. Finally, the self-directed design, also referred to as independent and learner-controlled, has no requirements for learner-to-

learner interactions, thus enabling students not only to self-pace their learning, but also to adapt the material they need to learn along with the overall learning experience; this design form is perceived to be used by all types of distance learning (Garrison, 2003).

Once more, defining online learning brings about similar challenges with the ones affecting e-learning, as presented in section 3.1; as a term, online learning is also used within different contexts with different meanings, and it has also been inaccurately used as a substitute term for other forms of learning, such as e-learning, digital learning, distance learning, web-based learning/training, etc. (J.L. Moore *et al*., 2011; Oliver & Trigwell, 2005; Passey, 2019; Sangrà *et al*., 2012; Stefanou, 2013; Triacca, Bolchini, Botturi, & Inversini, 2004; Watson, 2005). Among these false synonyms, the top three most commonly mixed are online learning, e-learning, and distance learning, with the term online learning appearing to be the most challenging to define (J.L. Moore *et al*., 2011). The relationship of online learning to e-learning is also a controversial issue; most scholars transfer the semantic relationship between the concepts ‘online’ and ‘electronic’, which implies that ‘online’ refers to one possible form of the - broader - ‘electronic’ concept, therefore viewing online learning as a sub-category of e-learning (e.g. Garrison, 2011; Harasim, 2000, 2006; Sangrà *et al*., 2012), but a few others claim the exact opposite, arguing that it is e-learning that is a form of online learning, and not the other way around (e.g. Triacca *et al*., 2004). Nonetheless, the predominant view is that online learning involves the Internet and the World Wide Web, whereas e-learning is considered a wider term, covering a large

collection of technology tools that can be employed to support any form of learning, and it does not necessarily require the use of the Internet (Stefanou, 2013). To illustrate, employing an interactive whiteboard or a computer in the classroom can be considered e-learning, without necessarily using the Internet.

All in all, the most widely accepted definitions of online learning describe it as learning via the use of technologies related to the Internet and the World Wide Web (e.g. Benson, 2002; Conrad, 2002; Hiltz & Turoff, 2005; J.L. Moore *et al*., 2011), with representative examples being “Education in which instruction and content are delivered primarily via the Internet. Online learning is a form of distance learning” (Watson, 2005, p.127) and “teacher-led education that takes place over the Internet, with the teacher and student separated geographically” (Watson *et al*., 2008, p.5). These two definitions both come from yearly reports reviewing the US state-level policy and practice regarding online learning in schools, for 2005 and 2008 respectively. Interestingly, in the equivalent yearly report of 2016 (Gemin & Pape, 2017), a concrete definition for online learning is no longer available; it seems that, although there are still instances of the term online learning in this report, the concept has been partly replaced by the term ‘digital learning’, which, along with ‘online course’, appear to have appropriated the critical attributes of online learning’s prior definitions (Gemin & Pape, 2017, p.62):

> Online course is a teacher-led education experience that takes place over the Internet, with the teacher and student separated

> geographically, using an online instructional delivery system to access course content and allow communication between the teacher and student and between students

and

> Digital learning is any instructional practice in or out of school that uses digital technology to strengthen a student's learning experience and improve educational outcomes. Our use of the term is broad and not limited to online, blended, and related learning. It encompasses a wide range of digital tools and practices, including instructional content, interactions, data and assessment systems, learning platforms, online courses, adaptive software, personal learning enabling technologies, and student data management systems.

As can be seen, the research team of this report seem to consider 'digital learning' a broader concept, possibly encompassing online learning - but given the lack of a precise definition for the latter in the same report, this assumption may not be valid.

Analogously to e-learning, Passey (2019) draws attention to the fact that, in the widely accepted definitions for online learning like the ones presented above, the emphasis is once more on the catered provisions - which, in the case of online learning are primarily the Internet and the World Wide Web.

3.3 Blended Learning

Research into blended learning has gained increased popularity during recent years. The concept of blended learning has recently become a “buzzword” (Chew & Jones, 2009; Graham, 2006; Graham, Allen, & Ure, 2005; Stefanou, 2013) and it is regarded as “the most logical and natural evolution of our learning agenda” (Thorne, 2003, p.16). Elliott Masie declares that “We are, as a species, blended learners” (Masie, 2002, p.A1) while Dziuban, Graham, Moskal, Norberg, and Sicilia (2018) extend this view by maintaining that it is our world that is, in essence, blended – and its blended elements are no longer separable. Graham observes that “the trend toward blended learning systems will increase. It may even become so ubiquitous that we will eventually drop the word blended and just call it learning” (Graham, 2006, p.7). The scholar’s prediction about dropping entirely the ‘blended’ adjective is also shared by other scholars, such as Masie (2006) and Massy (2006).

But what exactly is blended learning? It seems that blended learning is one more term for which numerous scholars express their concern over the ambiguity around the actual meaning of it (e.g. Dziuban *et al*., 2018; Graham, 2006, 2013; Kim, Bonk, & Teng, 2009; Moskal, Dziuban, & Hartman, 2013; Ocak, 2011; Oliver & Trigwell, 2005; Osguthorpe & Graham, 2003; Parchoma, 2011; Passey, 2019; Picciano, 2009; Stefanou, 2013; Teng, Bonk, & Kim, 2009; Thorne, 2003; Torrisi-Steele & Drew, 2013; Yen & Lee, 2011). There is a plethora of – frequently conflicting - definitions of blended learning throughout the extensive literature related to this topic. Furthermore, different

connotations may be elicited by this term: the same teaching practice may be regarded as blended learning by some educators but not by others (Chen, 2009; Driscoll, 2002; Picciano, 2009; Stefanou, 2013). A later section will attempt to chart the assorted definitions of blended learning.

Sanctioned as “the new normal” (Dziuban *et al*., 2018, p.n.p; Norberg *et al*., 2011, p.207) and also as “the new traditional model” (B. Ross & Gage, 2006, p.167), it might be argued that blended learning emerges as the prevailing teaching model of the future, naturally evolving as the latest generation in education systems (Stefanou, 2013; Thorne, 2003; Yen & Lee, 2011). Viewing education systems’ models as generations is not unusual; in fact, distance education systems have been grouped in generations by numerous scholars including Bernard *et al*. (2009), Bernard, Brauer, Abrami, and Surkes (2004), Dutton and Loader (2005), Meyer (2003), M.G. Moore (1990), M.G. Moore and Kearsley (2005), Phipps and Merisotis (1999), So and Brush (2008), Taylor (1995, 2001), and Zhang and Walls (2006). According to some researchers, there are three generations of distance learning systems: distance learning systems by correspondence, which lacked any interactivity element and can be seen as the first generation; the use of a single technology at a given time in an educational context can be seen as the second; and blended learning can be seen as the third (Phipps & Merisotis, 1999; So & Brush, 2008; Stefanou, 2013). Other scholars prefer to classify distance education generations by the technology tools employed, so the number of generations increases to five, labelled as correspondence, multimedia, telelearning, flexible learning, and the intelligent flexible learning

model respectively (Bernard *et al*., 2009, 2004; M.G. Moore, 1990; M.G. Moore & Kearsley, 2005; Taylor, 2001; Zhang & Walls, 2006). Both taxonomies identify blended learning as the latest generation, being the upgraded and improved natural product of the evolution in education systems.

According to Wong and Tatnall (2009), this evolution can be attributed to the three key changes in higher education that were identified by Garrison and Vaughan (2008): the extraordinary progress in communication technologies; the reduction of educators' contact time caused by institutional changes in higher education; and the acknowledgement of the traditional teaching and learning strategies' inadequacies to support the aforementioned changes. A visual representation portraying this evolution is also provided by Graham (2006, p.6) and can be seen in Figure 3.1.

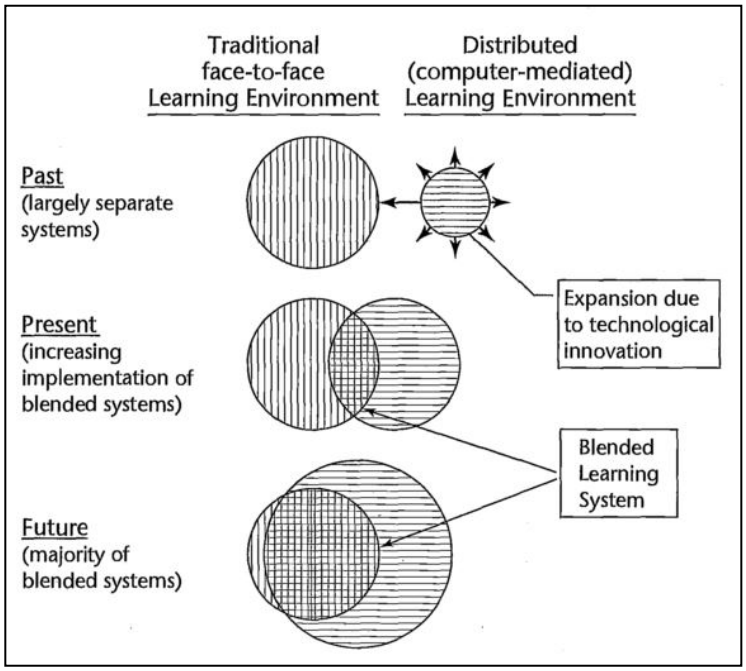


Figure 3.1: Progressive Convergence of Traditional Face-to-Face and Distributed Environments Allowing Development of Blended Learning Systems (Graham, 2006, p.6)

3.3.1 Blended Learning Synonyms and Definitions

It might be argued that the lack of consistency concerning the definitions of blended learning is - at least partially - most probably responsible for most of the criticism it has received over the years (Stefanou, 2013). As already mentioned, the problem is not the lack of definition, but, on the contrary, the plethora of available definitions, which in several cases come into conflict with each other. This section will attempt to analyse the established definitions and synonyms of blended learning. An important aspect to take into consideration for this analysis has to do with the second word in the term: it is blended *learning*, not blended *teaching*. Learners' needs and experiences are not reflected in many of the prevalent definitions, as these place more emphasis on the aspect of blended *management* of learning and not on learning per se.

The term blended learning by nature automatically implies a combination of elements that are related to learning; Thorne (2003, p.17) explains that 'blending' in general refers to "mixing together of wonderful ingredients to create something special for others to consume". Regarding blended learning in particular, the researcher humorously points out that the term's meaning should not be taken too literally, as this "could imply chopping people, or creating a mush". The same scholar praises the potential of blended learning of being "the ultimate perfect solution to tailoring learning to fit not only the learning need, but also the style of the learner".

There are several synonyms for blended learning in the literature. Mason and Rennie (2006) point out that an endorsed synonym for blended learning in the

US is ‘adjunct mode’, while Ocak (2011) and Vignare (2007) refer to ‘mixed’ learning, and Sharpe and Benfield (2005) employ the term ‘blended e-learning’. Vignare (2007) also acknowledges ‘flexible’ and ‘distributed’ as valid synonyms, while another widely used substitute term is ‘hybrid learning’ (Allen, Seaman, & Garrett, 2007; Chen, 2009; Dettori & Lupi, 2009; Gemin & Pape, 2017; Greener, 2008; McGovern & Barnes, 2009; Ocak, 2011; Rovai & Jordan, 2004; So & Brush, 2008; Stefanou, 2013; Torrisi-Steele & Drew, 2013; Vignare, 2007; Young, 2002). However, Osguthorpe and Graham (2003) argue that the term ‘hybrid’ does not qualify as a replacement for the term ‘blended’ within the context of characterising learning, as the former is a biology term referring to a new species created by interbreeding two other species, while the latter focuses on the techniques used to combine various ingredients in order to achieve an improved mix exhibiting appropriate balance of the original elements, which is the exact goal of learning. Chew and Jones (2009) and Graham (2006) share this concern regarding the use of the word ‘hybrid’, and along with Mason and Rennie (2006) suggest caution when synonyms such as ‘open’, ‘flexible’, ‘distributed’, ‘technology-enhanced’, or even ‘e-learning’ are used as there may be conceivable differences between these terms and the word ‘blended’.

But what exactly is the ‘blend’ in blended learning? Moving on to blended learning definitions, most researchers concur that the prevailing definition refers to blended learning as a combination of traditional face-to-face and online learning (e.g. Boelens, De Wever, & Voet, 2017; Boelens, Laer, De Wever, & Elen, 2015; Chen, 2009; Dziuban *et al*., 2018; Garrison & Kanuka,

2004; Garrison & Vaughan, 2008; Gemin & Pape, 2017; Graham, 2006, 2013; Graham *et al*., 2005; Kim *et al*., 2009; Lopez-Perez, Perez-Lopez, & Rodriguez-Ariza, 2011; Moskal *et al*., 2013; Norberg *et al*., 2011; Parchoma, 2011; Rovai & Jordan, 2004; Stefanou, 2013; Torrisi-Steele & Drew, 2013; Vignare, 2007; Yen & Lee, 2011). Nevertheless, many researchers draw our attention to the drivers behind the choice of the elements to blend and the actual process of blending. Some characterise the blending process as 'deliberate', and they further clarify the definition by explicitly stating that the purpose of this process is to enhance learning (Boelens *et al*., 2017, 2015; Boelens, Voet, & De Wever, 2018). Similarly, Graham (2013) points out that researchers who view blended learning as a mechanism supporting transformational change tend to include a quality aspect in the definition, therefore referring to blended learning as "the thoughtful integration of classroom face-to-face learning experiences with online learning experiences" (Garrison & Kanuka, 2004, p.96). This view is aligned with the one of Vignare (2007) who states that, based on evidence from asynchronous learning networks (ALNs) research workshops that were funded by the Sloan-Consortium (Sloan-C) in the US, blended learning is more than just integrating face-to-face with online instruction; the blend should be implemented in a structured and planned manner in order to add pedagogical value to the overall learning experience, and also to ensure a trade-off between face-to-face and online activities. In addition, addressing the complexity of the applicability of blended learning, Garrison and Kanuka (2004, p.96) highlight the fact that blended learning needs to be seen as "both simple and complex".

Following the same line of thought, Chew and Jones (2009) choose to expand the latter definition by indicating that the second component is technology in general, and not specifically online resources. A more explicit indication to the blended elements is attempted by some scholars, such as Stacey and Gerbic (2008), and Thorne (2003); these scholars respectively refer to a combination of “virtual and physical environments” (Stacey & Gerbic, 2008, p.965) and “multimedia technology; CD ROM [Compact Disc Read Only Memory] video streaming; virtual classrooms; voicemail; email and conference calls; online text animation and video-streaming […] combined with traditional forms of classroom training and one-to-one coaching” (Thorne, 2003, pp.16–17). Driscoll (2002) and Ocak (2011) are also quite explicit in describing the actual elements of the blend, suggesting several technology tools that support collaboration and communication along with various teaching practices and pedagogical approaches. They both place great emphasis on the need to achieve an appropriate balance in the blend.

A wider definition is adopted by both Chen (2009) and Harding *et al*. (2005) who consider the elements of the blend to be e-learning and traditional learning. Nevertheless, these researchers make use of the term e-learning, although their description of the blended elements makes it clear that they actually refer to online resources. Similarly, other scholars refer to a combination of classroom-based and online classes, implying however that ‘online’ does not refer exclusively to Internet/web-based sessions, but in general to computer-mediated ones (Boelens *et al*., 2017, 2015, 2018). It is important to point out that, as already discussed in sections 3.1 and 3.2, there

is an ambiguity around the definitions of e-learning and of online learning, similar to the one around blended learning, so it is not safe to assume that online learning and e-learning are synonyms.

Yet another way to refer to the blend in blended learning is according to the proportion of class-based versus computer-supported delivery. These proportions may vary across definitions, and may refer to more general ratios or to more specific percentages. For instance, Gemin and Pape (2017, p.62) define a blended/hybrid course as “one where the majority of the learning and instruction takes place online, with the student and teacher separated geographically, but still includes some traditional face-to-face ‘seat time’”. As is evident from this definition, the focus is on the ratio of online - to - traditional, without stipulating specific percentages. Contrastingly, Allen, Seaman and Garrett (2007, p.5) choose to indicate distinctive numbers, when they classify courses as “traditional”, when there is no content delivered online; as “web-facilitated”, when the proportion of online delivered content is between one and twenty nine percent; as “blended/hybrid”, when the online proportion is between thirty and seventy nine percent; and as “online”, when the online proportion is from eighty percent and above. Following a similar pattern, but with different percentages, Bernard, Borokhovski, Schmid, Tamim, and Abrami (2014) specify that classroom instruction in a blended course has to be at least fifty percent of the overall class time, with the online component reaching a maximum of fifty percent. It is also common for institutions to determine their own percentages; for College X, according to the current guidelines, the proportion of the online component of a blended

course has to be between thirty and fifty percent of the class meetings (see section 1.2.1 for more information about College X's blended learning policies). Nevertheless, it is important to point out that satisfying the requirements regarding the proportions of in-class versus computer-mediated interaction does not guarantee the effective implementation of blended learning; as the goal should be to improve the overall learning experience, special attention must be placed on the way that the various elements will be integrated, which is affected by context-related aspects such as the target learners' group, size of this group, learning outcomes, and general curriculum (Boelens *et al*., 2015; Garrison & Kanuka, 2004).

Dziuban, Hartman, and Moskal (2004) and Norberg *et al* (2011) suggest a more elaborate definition, regarding blended learning not simply as a blend of various modalities in different proportions, but as a pedagogical model that, focusing on place and space, graciously integrates the social benefits of face–to–face environment with the active learning potentials arising from the tools employed by the virtual environment. Therefore, quoting the scholars, blended learning can be seen as:

> a fundamental redesign of the instructional model with the following characteristics:
>
> - a shift from lecture- to student-centred instruction in which students become active and interactive learners (this shift should apply to the entire course, including the face-to-face contact sessions);

- increases in interaction between student-instructor, student-student, student-content, and student-outside resources; and

- integrated formative and summative assessment mechanisms for students and instructor. (Dziuban *et al*., 2004, p.3)

Likewise, Chen (2009) advocates that blended learning enables reflection along with personalised and customised teaching and learning. He specifies the blended elements as not just the traditional and online learning, but also e-learning technologies and multiple pedagogical techniques.

Following a similar line of thought, Singh and Reed (2001, p.2) emphasise the importance of the 'right' blend. They maintain that blended learning is more sophisticated than the simple combination of face-to-face learning with online learning, and that it can assist leaners in meeting the required learning outcomes "by applying the 'right' learning technologies to match the 'right' personal learning style to transfer the 'right' skills to the 'right' person at the 'right' time". According to the two researchers, the blending process also involves dimensions such as "blending offline and online learning", "blending self-paced and live-collaborative learning", "blending structured & unstructured learning", "blending custom content with off-the-shelf content", and "blending work and learning". Placing equal emphasis on learners' characteristics and needs, Ma and Zheng (2009) also embrace Singh and Reed's definition of blended learning.

An interesting point of view is presented by Moskal *et al*. (2013), who point out the importance of context when defining blended learning. The scholars perceive blended learning as a conceptual mental model, and they support that, as such, it can be seen as a generalised view of a learning situation which is affected by the specific learning context. Consequently, they do not dismiss available definitions as invalid; instead, they acknowledge that, depending on the context in which the blended learning model is implemented, a different definition and therefore blend can be applicable. Following this line of thought, the scholars explain that since blended learning can be seen from various perspectives, defining its forms may differ. For instance, when seen from the perspective of the various education/training entities, blended learning models can be categorised as higher education, K-12 education (ages 5-18 years), industry, the military, etc.; from the organisational infrastructure perspective, the emphasis lies in practical issues like cost, premises, development time, curriculum, etc; the focus shifts to matters such as learning communities, performance support, synchronicity, interaction, communication, learning enhancements, and cognition, when seen from the perspective of the learning environment. Moskal *et al*. (2013, p.16) come to the conclusion that there is no point in trying to reach a universal definition, since blended learning is “an evolving, responsive and dynamic process”, and as such, it affords to be customised by the involved institutions and educators in a way that will achieve maximum effectiveness and efficiency.

In an attempt to promote consistency and to standardise the term blended learning, some researchers have tried to arrange the most popular definitions in groups. According to Valiathan (2002, p.1), who embraces the National Institute of Information Technology guidelines about blended learning, there are three blended learning models:

- skill-driven learning, which combines self-paced learning with instructor or facilitator support to develop specific knowledge and skills
- attitude-driven learning, which mixes various events and delivery media to develop specific behaviours
- competency-driven learning, which blends performance support tools with knowledge management resources and mentoring to develop workplace competencies

Another classification is proposed by Graham *et al.* (2005) and later by Graham (2006) in 'the Handbook of Blended Learning', a book so frequently cited that it can be considered the 'Bible' of blended learning. This classification categorises definitions based on the type of components in the blend, thus resulting in three groups:

1. Instructional modalities (or delivery media)
2. Instructional methods
3. Online and face-to-face instruction

Graham criticises the first two groups as too inclusive, claiming that no type of learning can be excluded from these two. He therefore argues against any definitions that belong in the first two groups, such as the ones stated above by Singh and Reed (2001) and Driscoll (2002), as he considers these falling in the first and second group, respectively. Graham advocates for the third type, "online and face-to-face instruction", and he proposes his own definition: "Blended learning systems combine face-to-face instruction with computer-mediated instruction" (Graham, 2006, p.5).

A similar but more exhaustive classification system for the existing blended learning definitions is suggested by Oliver and Trigwell (2005), forming the following seven groups:

1. Mixing of e-learning and traditional forms of learning
2. Mixing online learning with face-to-face
3. Mixing media
4. Mixing contexts
5. Mixing theories of learning
6. Mixed learning objectives
7. Mixed pedagogics

The two researchers express their disapproval of all seven categories. Following the same line of thought with Graham (2006), they reject group 1 as too inclusive, as both its terms, i.e. 'e-learning' and 'traditional', are too vague; e-learning may refer to practically any type of technology, so no current type of learning can be excluded, whereas 'traditional' does not have a universal

meaning. The second group is too narrow, as it restricts the blend to Internet-based learning, while the third one is too wide, since ‘mediated’ learning refers to the use of many media, and it can be claimed that all learning types involve multiple media. Similarly, since all learning forms may occur in multiple contexts, the fourth group is also discarded. The problem with the fifth group is lack of consistency, since, according to Oliver and Trigwell, it is not possible to employ more than one learning theory at a time. Finally, the two scholars view the last two groups as too inclusive as well, since no learning type appears to be excluded from these two.

Garrison and Vaughan (2008, p.5) draw our attention to the fact that “[b]lended learning is not an addition that simply builds another expensive educational layer”, while Garrison and Kanuka (2004, pp.97, 99) argue that blended learning is “not just adding on to the existing dominant approach or method… [neither is it] just finding the right mix of technologies or increasing access to learning… it is not enough to deliver old content in a new medium”. Following the same line of thought, Osguthorpe and Graham (2003, p.227) warn us that blended learning is not just “showing a page from a website on the classroom screen”.

As demonstrated, there is a lot of ambiguity around the term blended learning, with no single universally accepted definition. Surprisingly enough, some studies on blended learning do not explicitly define it at all, leaving it to the reader to deduce the adopted definition from the context (e.g. Dean, Stahl, Sylwester, & Peat, 2001; Greener, 2008; Huang & Zheng, 2009). This

assumption that there is no need to explicitly define blended learning is also evident in the Higher Education Funding Council for England's (HEFCE) strategy for e-learning (HEFCE, 2009), where the absence of an explicit definition for blended learning comes in direct conflict with its prevalence in the recommended strategies; most probably the existence of a commonly accepted definition is assumed. Stefanou (2013) speculates that such an erroneous assumption may be the result of misinterpreting Garrison and Vaughan (2008, p.5): "Although the concept of blended learning may be intuitively apparent and simple, the practical application is more complex". This statement obviously intends to emphasise the challenges in implementing blended learning, and not to dismiss the concept as self-explanatory.

Classifying a learning strategy as blended learning – or not blended learning - is crucial, as blended learning is recommended and applied in a wide variety of contexts. It is, therefore, imperative to be able to define blended learning as a term, before investigating its use and value.

As already stated, a shared inadequacy in the majority of blended learning definitions is that they focus on the perspective of the educator or the course designer, and they neglect to address the learner's point of view; "[T]he word 'learning' [needs to] be rightfully returned to the learner" (Oliver & Trigwell, 2005, p.24). In alignment with this, Passey (2019) suggests caution regarding definitions that focus mainly on the provisions of blended learning, as these may fail to address the pedagogical value of blended learning in respect to

teaching and learning, so they might as well define ‘blended learning provision’ instead of ‘blended learning’ - this limitation concerning provisions was also pointed out by the same scholar regarding e-learning and online learning (see sections 3.1.and 3.2 respectively). According to Passey (2019), an accurate definition for blended learning should address not only a set of provisions, but also the integrated educational components - technological or not. Consequently, the scholar embraces the blended learning definition provided by Staker and Horn (2012, p.3):

> a formal education program in which a student learns at least in part through online delivery of content and instruction with some element of student control over time, place, path, and/or pace and at least in part at a supervised brick-and-mortar location away from home.

The above definition appears to be comprehensive and all-inclusive, and it is therefore the one adopted here.

3.3.2 Advantages of Blended Learning

Blended learning is praised by a plethora of scholars (e.g. Baepler, Walker, & Driessen, 2014; Boelens et al., 2017, 2015; Brown, 2003; Dziuban et al., 2018, 2004; Garrison & Kanuka, 2004; Garrison & Vaughan, 2008; Graham, 2006, 2013; Graham et al., 2005; Massy, 2006; Osguthorpe & Graham, 2003; Picciano, 2009; Spanjers et al., 2015; Stefanou, 2013; Yen & Lee, 2011). It is frequently reported that blended learning seems to have the potential to deliver an improved learning experience, appearing to outweigh not only the

traditional, face-to-face strategies but also the pure e-learning ones, i.e. the fully online, distance learning ones. In particular, many scholars maintain that blended learning can trigger the required shift towards learning-centeredness in higher education institutions (e.g. Garrison & Kanuka, 2004; Graham *et al*., 2005). The very blended nature of this form of learning is the one that renders it potentially superior to any single form of learning, since blended learning may deliver the benefits of both elements that constitute its mixture, i.e. face-to-face and online learning (Young, 2002); nevertheless, caution is recommended as it might also be possible to end up delivering a combination of the weaknesses of these same elements (Graham *et al*., 2005). Various researchers bring empirical evidence to support the dominance of blended learning over both face-to-face and online learning (e.g. Allen *et al*., 2007; Baepler *et al*., 2014; Chen, 2009; Dziuban *et al*., 2018, 2004; Garrison & Vaughan, 2008; Harding *et al*., 2005; Kelly, Lyng, Mcgrath, & Cannon, 2009; Kim *et al*., 2009; Lopez-Perez *et al*., 2011; Means, Toyama, Murphy, Bakia, & Jones, 2009; Moskal *et al*., 2013; Osguthorpe & Graham, 2003; Rovai & Jordan, 2004; Young, 2002).

There are several contexts in which the superiority of blended learning can be presumed, and more than one dimension that can be considered when attempting to group the potential benefits. One such dimension is identified by Graham *et al.* (2005, p.254), who acknowledge three main themes that can be also perceived as incentives for adopting a blended learning strategy: “(1) more effective pedagogy, (2) increased convenience and access, and (3) increased cost effectiveness”. Alternatively, some scholars choose to group

the identified benefits according to the involved actors, i.e. educators, institutions, and students (e.g. Osguthorpe & Graham, 2003; Stefanou, 2013), while it is quite common to also point out the benefits of blended learning when compared to either face-to-face or pure online learning modality (e.g. Garrison & Kanuka, 2004). This section will attempt to assimilate the benefits of blended learning addressing all three dimensions (themes, actors, modalities); for purposes of a more efficient presentation, one of the dimensions will be employed as the main classification system - in this case, the 'themes' dimension - , while the other two perspectives will also be addressed within each theme.

3.3.2.1 Pedagogy

From the point of view of educators, it seems blended learning may transform their role, since they are prompted to re-design their courses for the blended active learning model, thus becoming more facilitative, aligning with Rogers's (1968) model of the 'facilitative teacher'; instead of being viewed as the "founts of all knowledge" (Swenson, 2010, p.93), instructors can be seen as guides and mediators in the context of knowledge sharing (Dziuban *et al*., 2004). When compared to either face-to-face or pure online learning, educators report that blended learning appears to be not only pedagogically richer, but also more efficient, effective, and flexible, and with increased student interaction – a view which is also shared by students (Dziuban *et al*., 2004; Graham, 2006; McGovern & Barnes, 2009; Osguthorpe & Graham, 2003; Rovai & Jordan, 2004; Singh, 2003).

Given the ability of blended learning to overcome barriers prevalent on the traditional, face-to-face environment, including class size, location, and duration, this new learning modality may provide a suitable ground that can trigger changes in the prevailing in-class teaching strategy that demands students to be on the receiving end of traditional lectures. Graham *et al.* (2005), point out that this “transmissive” teaching strategy is also frequently evident in distance learning settings, and may overwhelm some students as they are expected to review large amounts of information by themselves, as independent learners, without interacting with an instructor or with peers. The scholars claim that blended learning’s pedagogical superiority can be presumed over both ‘pure’ learning modalities, i.e. in-class and online learning. Their main argument is that a balanced blend of face-to-face interaction and independent learning may bring a number of positive effects, including enabling active learning, facilitating peer-to-peer learning, providing educators with more flexible time management, which allows them to better support individual students, and allowing learners to remotely communicate with not only their peers but also with subject-experts.

One more identified advantage is the interdisciplinary nature of the blended learning model which leads to improved faculty effectiveness, as educators from various disciplines share knowledge and skills (Dziuban *et al*., 2004).

Yet another argument is made by Harding, Kaczynski, and Wood (2005), who stress there are several reasons that prompt educators to demonstrate their preference towards blended learning, such as supporting weaker students,

reducing the potentially high demands that an equivalent online course could impose on students, familiarising students with technology, and decreasing the required in-class student attendance time.

Furthermore, blended learning's potential contribution in creating and maintaining communities of practice, also known as 'communities of inquiry', constitutes one more attribute adding to its popularity. These communities are praised by multiple scholars, mainly because they stimulate learners' critical thinking and reflection as they are created beyond the boundaries of the traditional classroom (Garrison & Kanuka, 2004; Garrison & Vaughan, 2008; Parchoma, 2011; Rovai & Jordan, 2004; Stefanou, 2013).

An interesting argument regarding the pedagogical dominance of blended learning over 'pure' e-learning and online learning is made by Passey (2019). The researcher, drawing from the existing literature and from his own experience and professional practice with online programmes, stresses the difference between concerns about provisions and concerns about pedagogy. As already pointed out in sections 3.1 and 3.2 on e-learning and online learning respectively, Passey (2019) maintains that the prevalent definitions for both e-learning and online learning reveal that these learning forms are primarily concerned with the tools and media that can support course or programme elements, rather than pedagogical approaches to teaching and learning. Contrastingly, the scholar points out that the main emphasis of blended learning is not just on provisions, but on the ensued pedagogy, focusing on how the various provisions - related and non-related to

technology - can be blended to achieve an enhanced overall educational experience.

3.3.2.2 Increased Convenience and Access

Following a similar line of thinking with the pedagogy-related benefits, Graham *et al.* (2005) maintain that a balanced blend of face-to-face and online activities may result in an enhanced student and instructor experience. As opposed to the traditional classroom environment, instructors and students may benefit not only from face-to-face contact and interaction, but also by the reduced requirement of being physically present, which promises more flexible time management for both learners and educators. Moreover, reduction of commuting and parking stress is also reported as an advantage of blended learning over the traditional in-class setting, for instructors and students alike (Willett, 2002).

Osguthorpe and Graham (2003) also point out that educators report that, in comparison to the face-to-face classroom environment, blended learning facilitates revisions and also access to the curriculum material. In addition, there is evidence of students stating that blended learning provides them with more preparation time, so they are not as stressed as in a conventional classroom setting (McDonald, 2012).

The above stated reasons can also act as the drivers for blended learning adoption by educational institutions, as administrators realise that both students and faculty are more responsive to the blended model than to either

the face-to-face or the pure online one. Dziuban *et al*. (2004) also note that blended learning initiatives may meet the rising demand for more flexible learning opportunities.

Yet another benefit of blended learning from the institution's point of view is related to student support: although offering fully online (distant) courses may draw new incoming students, the combination of online learning with traditional face-to-face strategies may assist in the retention of the existing students by supporting and facilitating them (Dziuban *et al*., 2004; Garrison & Vaughan, 2008).

Comparing blended learning to pure e-learning, there is evidence of blended learning taking the lead as e-learning shows significantly lower completion rates of self-paced tutorials; the critical factor making the difference regarding completion rates seems to be the presence of personal, face-to-face interaction (Singh & Reed, 2001). In addition, there are studies that demonstrate that blended courses exhibit withdrawal rates and grade performance similar to the ones of face-to face courses, which are lower than the ones of fully online courses (Dziuban *et al*., 2004).

From the point of view of students, blended learning courses seem easier and more compatible to their lifestyles than conventional, face-to-face courses; students seem to perceive higher value in the more active type of learning enabled by the blended model - at least in some cultural contexts (Dziuban *et al*., 2004; McGovern & Barnes, 2009). Student satisfaction appears to be higher in blended learning environments than in the traditional face-to-face

ones (Baepler *et al*., 2014; Kelly *et al*., 2009; Martínez-Caro & Campuzano-Bolarín, 2011). Moreover, students report that they feel more comfortable when they need to communicate possible concerns and/or disagreements with either their instructors or their classmates via online forums that are frequently provided in a blended learning environment (Garrison & Kanuka, 2004). Aligned to this last point, Meyer (2003) argues that the permanent nature of these asynchronous online forums provides to students extended time availability, and this may trigger more critical, thoughtful discussions compared to analogous discussions that take place during the conventional face-to-face, in-class context.

3.3.2.3 Increased Cost Effectiveness

The fact that the focus of blended learning is on the learning outcome and not, as in other learning forms, on the delivery method, may contribute in the reduction of course development time and cost, adding therefore one more point in favour of blended learning adoption by both educators and academic institutions (Dziuban *et al*., 2004; Osguthorpe & Graham, 2003; Singh & Reed, 2001). Moreover, there is evidence that conversion of existing conventional face-to-face modules to blended format can lead not only to improvements in quality but also to significant course cost savings (Graham *et al*., 2005).

Another advantage for all involved parties is associated to students and educators required to spend less time in a physical classroom which leads to improved efficiency of classroom use, and also to potential reduction of

commuting costs, traffic on-campus and therefore of parking needs (Baepler *et al*., 2014; Dziuban *et al*., 2004; Graham, 2013; Singh & Reed, 2001).

Yet another cost-related advantage as far as the academic institutions are concerned is that, similarly to pure online learning, the online component of blended learning has the potential to reach large audiences, without geographic constraints, while the face-to-face component can provide the additional value of direct personal interaction (Graham *et al*., 2005).

3.3.3 Drawbacks and Challenges related to Blended Learning

All the aforementioned attributes of blended learning are undoubtedly extremely significant. Nevertheless, scholars draw attention to challenges that may arise with blended learning implementation. Once more, there is more than one dimension that is related to these challenges; as with the classification of blended learning benefits, one can view the associated challenges from the point of view of the actors involved (educators, students, institutions), while another perspective would be the comparison of blended learning with the two 'pure' learning forms; a third dimension can once more be a thematic one. Graham *et al.* (2005, p.256) identify three main thematic categories, i.e. "(1) finding the 'right' blend, (2) the increased demand on time, and (3) overcoming barriers of institutional culture". Following the same line of thinking with section 3.3.2, the challenges identified in literature will be grouped here by Graham *et al.*'s (2005) three categories, while the other two dimensions (actors and learning modalities) will also be addressed within

each group. It should be noted that the last thematic category is expanded to address barriers of not only institutional but personal nature as well.

3.3.3.1 Choosing an Appropriate Blend

It is important to emphasise that all the aforementioned characteristics of blended learning have the *potential* to become benefits, and some educators appear sceptical about the way blended learning techniques are actually implemented. Marshall (2011, p.2) argues that the - undoubtedly valuable - online component of blended learning may "...cut down on the face-to-face contact that is the lifeblood of a traditional classroom", so she recommends that academic institutions have to include in their blended learning guidelines a requirement that the time spent online should not exceed the in-class, face-to-face time.

As already stated, scholars stress that an effective blended learning implementation strategy should attempt to maximise the combined pedagogical benefits of face-to-face and computer-mediated settings, while at the same time avoiding their limitations (Graham *et al*., 2005; Osguthorpe & Graham, 2003; Thai, De Wever, & Valcke, 2017). Graham *et al.* (2005, p.256) visually portray this process in their figure titled "Blending the strengths of F2F [face-to-face] and CM [computer-mediated] learning environments", reproduced here as Figure 3.2; the figure displays four different blends, labelled A, B, C, D, and as can be seen, blends A and B are effectively used by maximising both modalities' benefits, while blends C and D seem to be misused.

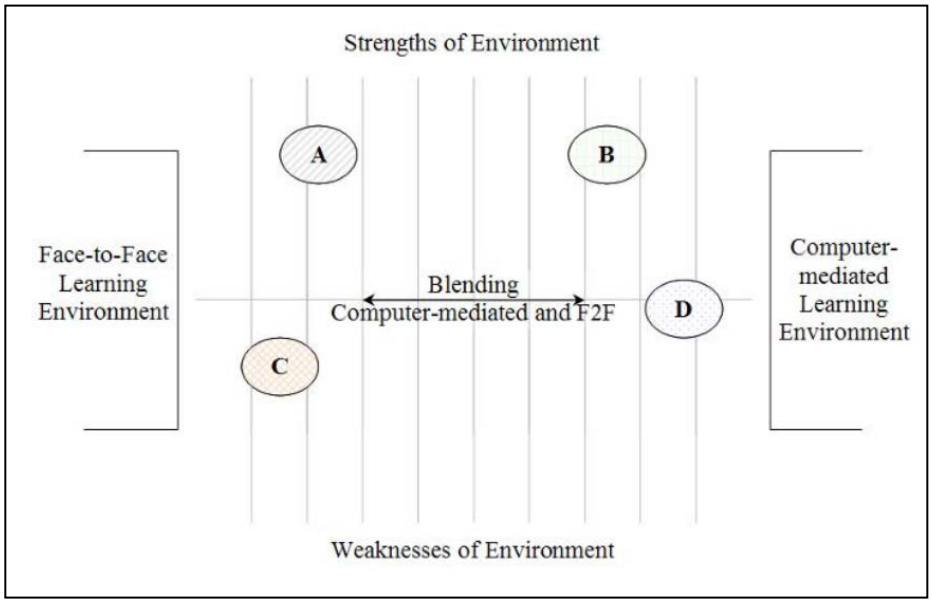


Figure 3.2: Blending the strengths of F2F and CM learning environments (Graham *et al*., 2005, p.256)

3.3.3.2 Increased Demand on Time

Graham *et al.* (2005) claim that the familiarity of educators with one or both of the 'pure' modalities unfortunately does not automatically imply that they will be comfortable with combining the two, as the use of both environments increases the amount of time that educators are required to invest in preparation and delivery of the curriculum. This demand for additional time is perceived by instructors as stress-invoking, especially within the context of converting an existing face-to-face course to a blended format (Hartman, Dziuban, & Moskal, 2000). Furthermore, in comparison to the 'pure' forms, both educators and students need to invest more time in order to accommodate the increased interaction requirements of a blended learning environment (Graham *et al*., 2005).

3.3.3.3 Barriers of Institutional and Personal Culture

The familiarity of administrators, educators, and students with the 'pure' learning forms, i.e. the conventional in-class setting and the computer-mediated one, usually formulates an established institutional culture regarding procedures and policies, which may lead to resistance to the changes needed for an effective implementation of blended learning (Graham *et al*., 2005). This view is aligned with the recommendation suggested by Moskal *et al.*, (2013) regarding the implementation of blended learning in a way that it ensures achievement of this new modality's aims, while in resonance with the overall organisational context and capabilities.

Dziuban, Hartman and Moskal (2004) point out that administrators may face practical issues related to optimised scheduling and allocation of physical classrooms, and also to the increased technology requirements of the blended model. The same scholars report that another challenge from the institution's perspective is that administrators need to perform a cost-benefit analysis to assess the financial effectiveness of investing in blended learning, as the cost of supporting both educators and students, especially during the conversion phase, can be quite high.

A student-related consideration is related to the pace of blended courses which differs both from the traditional, face-to-face one and from the distance learning one, so students need to realise that they may have to adapt their accustomed studying styles and practices (Dziuban *et al*., 2004). Today's students have high expectations regarding the immediacy of technology,

impatience being one of their primary characteristics, which also leads to fast decision-making. Within an educational context, there are several implications of these characteristics that emerged as a result of the ubiquity of technology in those people's lives - mainly with regard to learning and communication. Students today very frequently rely on technology even inside the traditional classroom environment; they depend on their mobile devices and computers for common in-class tasks such as note keeping - and also for socialising, disregarding the classroom etiquette, as they do not consider this a distraction. However, in an online class environment, their expectation of instant and customised feedback and answers may result in frustration (Cilliers, 2017; Preville, 2018). Moreover, in spite of these students' attachment to technology - especially for their everyday life tasks and entertainment - there is evidence that some students do not embrace the idea of using technology for learning purposes. These are mainly students who, being multimedia users, do not appreciate using a computer-mediated platform to complete conventional text-based activities such as reading and writing; nevertheless, the same students report that they would be responsive to visual and multimedia learning resources, such as watching video tutorials or using an interactive electronic textbook (Nazarenko, 2015).

In essence, it is not only the educators that have to change their teaching practice in order to accommodate the blending model; "faculty have to relearn how to teach" but students, too need to "…relearn how to learn" (Dziuban *et al*., 2004, pp.10, 9).

Moving on to yet another challenge, a critical requirement as far as students are concerned for effective blended learning is self-discipline, mainly in respect to the online component of the blend, which, as already mentioned relies mostly on independent learning. Students who are used to the traditional classroom environment are accustomed to being guided and checked by their instructors very frequently during their face-to-face interactions, so the sudden independence that surfaces in a blended setting may lead to students' procrastination and even failure to complete online assignments (Graham *et al*., 2005). Consequently, academic institutions will have to acknowledge this issue, and come up with additional provisions to minimise decreased performance and dropout rates.

Yet another concern associated with organisational culture is related to potential lack of departmental or institutional support towards endorsing the necessary changes for blended learning, which makes faculty reluctant to make an effort towards this new modality (Hartman *et al*., 2000). As suggested by Moskal *et al.* (2013), it is imperative to ensure adequate support not only as far as the institutional infrastructure and designing the modules are concerned, but also for faculty and students. Providing support at all organisational levels places a critical requirement for money and resources, which may not be feasible in all institutions.

As can be seen, blended learning comes not only with blessings but with challenges, too; nevertheless, it is evident that most scholars believe that the weaknesses are heavily outweighed by the benefits - provided that the design

of a blended setting is implemented taking under consideration of specific guidelines and/or frameworks, such as the ones discussed in the next chapter.

Chapter 4 Implementing Blended Learning Provision

As already discussed, technology has been used by higher education institutions for a number of decades, aiming to enhance the educational experience. The modality of blended learning seems aligned to the wider aspiration of improving the effectiveness and the efficiency of the overall experience of teaching and learning; in an attempt to develop guidelines that would standardise the adoption and implementation of blended learning provision, various models and frameworks have been produced as the result of scholarly research in the field.

An indicative example of such a framework is the one designed by Graham, Woodfield, and Buckley (2013), which focuses on identifying issues and metrics that institutions should take into consideration before and during blended learning implementation. The framework identifies three main stages for institutional adoption of blended learning, i.e. awareness and exploration, adoption and early implementation, and mature implementation and growth. The researchers bring evidence from case studies of multiple universities in the US in order to identify key features for each stage, in respect to structure, main strategy, and support issues. Based on the above, it can be inferred that the value of this framework is primarily on observing and interpreting practice, and not so much on the developmental aspect of implementing blended learning to specific modules and programmes.

Along the same lines, Gaebel, Kupriyanova, Morais, and Colucci (2014) researched into e-learning and blended learning in European universities in order to consider standardising blended learning policies on behalf of the European University Association (EUA); their main indicators were the degree of adoption, i.e. across the curriculum or just in some modules/departments by all or some educators/students, and the extent of consideration by the university administration in respect to quality assurance and institutional management. Similarly to the framework suggested by Graham et al. (2013), this one also focusses on investigating value and challenges from the point of view of the institutional administrators; therefore, although it can certainly contribute to this case study, it does not provide specific steps to be followed for the potential transition of the module under investigation to blended learning mode.

Another widely used model is proposed by Garrison and Vaughan (2008), who chose to focus on the key requirements for a successfully implemented blended learning provision; these requirements can be summarised as "Thoughtfully integrating face-to-face and online learning; Fundamentally rethinking the course design to optimize student engagement; Restructuring and replacing traditional class contact hours" (Garrison & Vaughan, 2008, p.5). The identified requirements are of significant value, and they may serve as a starting point for the purpose of this study; nevertheless, these requirements are very generic, and, similarly to the first two models presented above, this one too does not offer clear guidelines for the blended learning implementation investigated in this case study.

The aforementioned well-renowned models are certainly not the only ones available observing and interpreting practice in the area of blended learning, as there is an extensive literature on the subject. Nevertheless, the nature of this study, focusing on potential development of blended provision for the module under investigation, prompted the choice of a model offering a developmental approach, rather than just observing and interpreting practice. Consequently, an ideal model seemed to be the one suggested by Passey (2019), who takes into consideration a range of representative research works regarding blended learning adoption and implementation, and recommends a model that focuses on the aspect of developing the necessary blended learning *provisions*; this model is essentially a series of steps that can be followed towards developing a successful blended learning provision. Passey's framework is one of the most current, up-to-date models; it also appears to be all-embracing and quite comprehensive, drawing from the extensive literature on the subject since the beginning of blended learning, and taking practice into account. It is therefore this model that is adopted for this study; the model's steps are presented below.

4.1 Steps towards developing Blended Learning Provision

4.1.1 Step 1: Identify the Elements to be undertaken on Site

Passey (2019) suggests that the elements of the module that should continue to be delivered via the traditional, face-to-face mode need to be identified.

4.1.2 Step 2: Associate the Online Elements to 'New' Ways of Learning

The learning outcomes for the elements that will be delivered online should be determined, in order to relate these to one or more ‘new’ ways of learning, such as “problem-based learning (PBL), authentic learning (AL), dialogic learning (DL), situated learning (SL), technology- enhanced learning (TEL), networked learning (NL), computer-supported collaborative learning (CSCL), or mobile learning (ML)” (Passey, 2019, p.11). This list is treated here as inclusive but non-exhaustive; the presence of other ‘new’ ways of learning is acknowledged, and perhaps other researchers may choose to address those, too. Nevertheless, within the context of this study the above list is considered representative of the main categories of such ways, and other ways not listed here may possibly be sub-forms of this list’s elements. A summary of the main characteristics of the above listed ‘new’ ways follows.

4.1.2.1 Problem-based Learning (PBL)

Problem-based learning enables learners to recognise the challenges they are expected to overcome and to determine an appropriate way to face these (Passey, 2019). According to Barrows (1996), problem-based learning was born in the 1970s as a pioneering educational method developed for the new medical school of McMaster University Faculty of Health Sciences. Its impressive success prompted the Association of American Medical Colleges to recommend changes in medical education towards PBL, advocating among others self-directed learning and problem-solving, along with decreasing conventional teaching time (Barrows, 1996; Muller, 1984). Gradually, numerous schools of various disciplines were encouraged to convert their

curricula to problem-based ones, and problem-based learning is now widely accepted as a ‘new’, innovative educational approach (Passey, 2017, 2019).

Barrows (1996) identified the primary features of problem-based learning as:

1) Student-centred learning; students personalise their learning, as, given a specific problem, they are expected to determine not only what they need to learn in order to better address this problem, but also how to learn. On the other hand, teachers’ roles change as they need to guide students in the above-mentioned process, while subject experts should also be available to students to act as consultants.
2) Small student groups; the composition of groups changes over time, so that students benefit from having to collaborate with different people.
3) Teachers become ‘tutors’; the role of teachers shifts to facilitators/guides. Tutors are assigned curricular units in which they are not experts, as they are expected to merely guide their students by demonstrating the questions students should eventually ask themselves in order to effectively and efficiently work out the given problem.
4) Learning core and stimulus is in the form of problems; students are presented with realistic problems which simulate real challenges, related to the curriculum unit. Students are then expected to determine what they need to learn in order to address these challenges, and how this interdisciplinary knowledge can be applied to eventually solve the given problems. The experience the learners gain from this process will

later serve them when they will have to cope with real-life cases in their actual work environment.

5) Problems are the means for students to develop problem-solving skills; problems need to be as realistic as possible, simulating real-life cases - always within the context of the specific curriculum unit.
6) Self-directed learning leads to new information; students learn as a result of their own research and study, which involves collaborating with each other, debating, comparing, and evaluating their views. Eventually this leads to acquisition of new information and eventually new knowledge.

Barrows (1996) states that problem-based learning enables the following learning outcomes:

1. Development of a knowledge base that:
    a. Is integrated, i.e. it draws its content from all schools, in order to ensure that there is an assimilated common problem-based learning curriculum for all students.
    b. Is based on real information from real work environments.
    c. Employs efficient and effective problem-solving processes used in real work environments.
2. Development of effective skills for:
    a. Self-directed learning.
    b. Collaboration in teams.

4.1.2.2 Authentic learning (AL)

Authentic learning occurs by using real-life meaningful knowledge applications within an educational setting, with students becoming inquirers instead of passive lesson learners, reflecting on their learning experiences and on how these are related to their own practice (Maina, 2004; Rule, 2006). Passey (2017, 2019) embraces the findings of the research of Donovan, Bransford, and Pellegrino (1999) on human learning as the primary characteristics of authentic learning, which can be summarised as:

1. Students have their own conceptual models of the world, which affect students' expectations of what they will learn in the classroom. Unless teachers are prepared to acknowledge these conceptual models and guide students towards adapting these to reflect the actual concepts of the specific curriculum unit, students' learning may fail to take place.
2. Adequate factual knowledge on a study subject needs to be combined with the appropriate conceptual model in order to successfully lead to students' learning competence and mastery in that particular subject. Factual knowledge is obviously needed, providing the necessary information about the subject, but it is the conceptual framework that will help students organise these facts and transform them into knowledge that they will eventually apply to new problems.
3. Students can be taught strategies that enable them to self-monitor their learning process. These strategies include evaluating understanding by determining any additional facts that may be required, and comparing

already acquired information with the new facts, therefore updating both their conceptual model and knowledge base.

Based on these findings, Donovan *et al*. (1999) suggested that research on teaching and learning processes can influence classroom practice via four paths, i.e. educational materials, pre-service and in-service education, policy, and the general public.

4.1.2.3 Dialogic Learning (DL)

According to Alexander (2017), dialogic teaching and learning stimulates critical thinking, with teachers engaging students into discussions; encouraging students to talk allows educators not only to better identify students' learning progress and needs, but also determine the optimal learning tasks to follow. Nevertheless, not any type of discussion can foster dialogic learning, as there are some critical requirements for DL, such as: profound interactions, which will prompt students to think and reflect on the counter arguments; questions, which cannot be answered by merely reciting factual information; answers, which have to be justified and followed by constructive feedback; comprehensive contributions; meaningful exchanges; discussion and argumentation with sufficient evidence to support the arguments; professional engagement with the curriculum unit; and the appropriate classroom environment that can facilitate all the above. Alexander's (2017) views are aligned to the ones of Mezirow (2003) on transformative learning. Mezirow (2003) pointed out the value of dialectical discourse in adult learning education, in respect to the learners' prompted

critical reflection. The same researcher also stated that the ultimate aim of educators should focus on encouraging students towards becoming active and independent learners.

4.1.2.4 Situated Learning (SL)

Lave and Wenger (1991) were the first to discuss situated learning, by referring to SL as a learning model within the context of communities of practice. According to the scholars, since learning is not dependent entirely on the learner, but it is essentially a social process, it should be seen as a socially situated activity and it should therefore occur in the same environment to which it is applicable. Learners become members of the community in which they are taught, and learning may be achieved not via mere accumulation of facts but via the learners' interactions with their community of practice.

4.1.2.5 Technology Enhanced Learning (TEL)

Technology enhanced learning is a rather broad term; a definition which was adopted in 2012 by the Universities and Colleges Information Systems Association (UCISA) but is still applicable states that TEL is:

> Any online facility or system that directly supports learning and teaching. This may include a formal VLE [virtual learning environment], an institutional intranet that has a learning and teaching component, a system that has been developed in house or a particular suite of specific individual tools. (Walker, Voce, & Ahmed, 2012, p.2)

Kirkwood and Price (2013) suggest caution regarding the potentially implied assumption that technology by default enhances learning, and they suggest that researchers should focus on investigating processes that can be used to design technologies that may enhance learning, and also to evaluate and measure the resulting enhancement in learning. A report issued by the Higher Education Funding Council for England (HEFCE, 2009, p.2) states that enhancements brought about by the application of technology within an educational context vary; depending on the type of technology employed, such benefits could involve:

- efficiency (existing processes carried out in a more cost-effective, time-effective, sustainable or scalable manner)
- enhancement (improving existing processes and the outcomes)
- transformation (radical, positive change in existing processes or introducing new processes)

4.1.2.6 Networked Learning (NL)

According to Dirckinck-Holmfeld, Jones, and Lindström (2009), a widely adopted definition for networked learning is:

> learning in which information and communications technology (ICT) is used to promote connections: between one learner and other learners; between learners and tutors; between a learning community and its

learning resources. (Goodyear, Jones, Asensio, Hodgson, & Steeples, 2005, p.473)

As becomes evident from the definition, networked learning does not refer solely to the interaction of learners with online resources; an essential aspect of NL is the interaction between the people involved in the learning experience. The format of these interactions can vary, including graphics, text, audio, video, or any combination of these. It should also be pointed out that a real-time mode is not a requirement for networked learning, as its compendium of interactions can occur in either synchronous or asynchronous mode, with the latter being preferred for the added flexibility it offers to the interacting parties regarding their use of time (Dirckinck-Holmfeld *et al*., 2009; Goodyear *et al*., 2005).

4.1.2.7 Computer Supported Collaborative Learning (CSCL)

Stahl *et al.* (2006, p.409) define CSCL as "…an emerging branch of the learning sciences concerned with studying how people can learn together with the help of computers". As already stated in section 2.1.2.2, CSCL was coined as a term in 1989, at an international workshop in Italy (Stahl & Hesse, 2006). This 'new' way of learning emerged as an assimilated outcome of the shift from the solo-learner model towards the group-collaborative one, and also of the introduction of computers as aids in the educational environment. Its foundations lie in two different domains: in the cooperative and constructivist learning theories which advocate that a more consolidated learning experience can be the result of both the conventional interactions between

teachers and students, and of the exchanges that occur between students (Alavi, 2019; Harasim, 1990; Solimeno, Mebane, Tomai, & Francescato, 2008); and in the evidence regarding the use of computers as mediators of any interactions taking place within an educational setting (Anderson, Rourke, Garrison, & Archer, 2001; Kanuka, 2002; Molinari, 2004; Solimeno *et al*., 2008). Stahl *et al*. (2006) draw our attention to the fact that CSCL should not be regarded as a collection of corroborated, one-size-fits-all educational techniques, but rather as an opportunity to explore the potential catalytic use of computers and technological resources as facilitators of collaborative learning practices.

4.1.2.8 Mobile Learning (mLearning or ML)

Mobile learning has received various definitions over the years; earlier definitions referred to ML as learning supported by the use of a portable, mobile computational device such as a palmtop or handheld computer, a personal digital assistant (PDA) or a smart telephone (Crompton, 2013; Laouris & Eteokleous, 2005; Quinn, 2000; Savill-Smith & Kent, 2003; Sharma & Kitchens, 2004). It is evident that those definitions described mobile learning from a technocentric perspective, focusing primarily on the employed technological devices; nevertheless, numerous scholars have been exploring potential attributes that would expand the scope of mobile learning and therefore redefine it more accurately as a multi-dimensional concept (Caudill, 2007; Crompton, 2013; Laouris & Eteokleous, 2005; Sharples *et al*., 2006). Upon surveying the prevailing ML literature, Crompton (2013) claims that, in

addition to the device being used, there are three other pillars of equal significance that shape mLearning: the applied pedagogy, i.e. the specific method and techniques used to teach and learn; the context of the educational setting, which could be a formal academic environment such as a classroom or an informal setting, self-directed or guided, spontaneous or planned; and the social interactions that occur within this setting, between the learner and any other individuals involved in the learning experience. Given these four critical constructs of mobile learning, Crompton (2013, p.83) defines mLearning as “learning across multiple contexts, through social and content interactions, using personal electronic devices” - a clear and unambiguous definition drawing from the majority of prevailing definitions, and therefore the one that is also adopted here.

4.1.3 Step 3: Identify the Appropriate Forms of Learning Activities

Based on the pairs of learning objectives and ‘new’ ways of learning that were identified in step 2, Passey (2019) advises that the specific types of learning activities that can facilitate these need to be considered. The emphasis should be on the interaction type that would be most suitable to support the specific ‘new’ learning approach towards the accomplishment of the associated learning outcome. According to Passey (2014, 2019) such interactions could be “instruction, explanation/illustration, direction, demonstration, discussion, scaffolding, questioning, speculation, consolidation, summarising, initiating/guiding exploration, or evaluating learners’ responses” (Twining &

McCormick, 1999, cited in Passey, 2019, p.11). A clarification of the meanings of these terms follows.

4.1.3.1 Instruction

An all-purpose meaning of the term associates instruction with the broader concept of education. Nonetheless, the term instruction is traditionally used to refer to transferring of skills and knowledge, usually in the form of lectures; this certainly implies that the elements to be transferred are already owned by the educator-transferor (V. X. Wang, 2011). Passey (2014, p.29) summarises the characteristics of instruction as “a teacher indicates what learners should do, how they should do it, and what is expected as outcomes”.

Reigeluth and Carr-Chellman (2009) point out that the concept of instruction is frequently contrasted with the one of construction, mainly in respect to the acting party; the former is considered to be something that is done to learners, implying that these are passive recipients of instruction, with the action being done by the educator, while ‘construction’ is to be performed by the learners themselves. Nevertheless, a core principle of the learning theory of constructivism is that learning cannot happen in passive mode, but it can only occur if learners actively manipulate the learning material towards constructing their own knowledge. Consequently, according to the scholars, instruction is “anything that is done purposely to facilitate learning. It includes constructivist methods and self-instruction, as well as more traditional views of instruction, such as lecture and direct instruction” (Reigeluth & Carr-Chellman, 2009, p.6).

4.1.3.2 Explanation/illustration

This strategy is employed when “a teacher explains ideas or concepts, verbally, and may illustrate these with gesture, images, or other resources” (Passey, 2014, p.29). At its most basic, explanation “is an answer to a ‘why’ question, or to a ‘how’ question” (Gregg, 1993, p.278). A widely accepted definition of the term is “an act intended to make something clear, understandable, or intelligible” (Norris, Guilbert, Smith, Hakimelahi, & Phillips, 2005, p.546); the general purpose of an explanation is to “resolve a puzzlement” (Norris *et al*., 2005, p.546). In many cases, the term is also identified as ‘prediction’ or ‘description’; however, these are not exact synonyms; Gregg (1993) stresses that explaining something - for instance, a phenomenon such as an earthquake - does not necessarily result in predicting it; similarly, describing something - such as a solar eclipse - does not necessarily result in explaining it. Norris *et al.* (2005) provide a more detailed analysis about the various aspects that an explanation may address; according to the scholars, an explanation could involve:

a) Assigning: when it assigns, develops, or expands the meaning of something; usually this occurs when the puzzlement is a question of the type ‘what is…’.
b) Justifying: typically this occurs when the puzzlement is a question of the type ‘why…’, and it encompasses an appeal to standards or norms.

c) Describing: when it portrays what happens - as opposed to the reason that it happens.
d) Giving a causal account: when it provides an account of what caused something - as opposed to simply describing it.

4.1.3.3 Direction

Direction in a learning activity involves assisting the learner understanding the goal of the learning activity; essentially, “a teacher offers overall ideas of what needs to be done, and what is expected, without giving precise detail” (Passey, 2014, p.29).

Laurillard (2002, p.58) explains that: “The presence of a goal is prefigured in the unity between action, feedback and integration; these aspects of the process only make sense if there is also direction, provided by a goal”. Direction is therefore valuable as it assists learners to reflect on the associations between the goal and the action-feedback-integration compendium.

4.1.3.4 Demonstration

According to Passey (2014, p.29), this strategy involves “a teacher provid[ing] a demonstration as an example of what happens, or what learners should do”.

Within an educational context, demonstrations involve proving or clarifying a concept by evidence or reasoning, using examples that can exhibit the concept’s efficiency and/or value. According to O’Brien (1991, p.933),

“Knowledge cannot be poured out from the teacher’s mind (or injected under pressure) into the learner’s”. Demonstration is considered a method that, aligned with constructivist learning theory, can engage the learner’s mind to employ their own conceptual framework in order to filter and transform the data perceived within the context of the overall learning experience; the end result of this process is the construction of knowledge.

Kauffman (1990) stresses that demonstrations are among the most effective educational practices. Drawing from his own experience of teaching science to university students, he states that demonstrations tend to leave an impression to students, and frequently they are one of the few memories they keep from a lesson - regardless of the time elapsed. According to the scholar, demonstrations have the potential to excite learners, especially younger ones; however, students can benefit from demonstrations regardless of their age.

4.1.3.5 Discussion

A representative definition for the term discussion is: “An interactive exchange in which persons ask questions, clarify views, share opinions, and disagree with presented ideas” (R.A. Collins & Zacharakis, 2009, p.296). During a discussion, “a teacher elicits ideas from learners, picks up on specific points, and encourages other learners to contribute ideas or comments” (Passey, 2014, p.29).

Discussions involve interactions between learners and educators; aligned to constructivist learning theory, discussions promote active learning as they

increase student involvement and engagement, and may also foster student satisfaction and achievement (J. Clark, 2001).

It is important to point out that discussions are not limited to a face-to-face setting. Within the context of online learning environments (OLEs), Clark (2001, p.120) defines discussion as “a series of related contributions between two or more members of a class in an OLE”. The scholar states that discussion, similarly to collaboration, constitutes an acknowledged method of facilitating learning in an OLE.

4.1.3.6 Scaffolding

Scaffolding is another teaching and learning method that draws from social constructivist learning theory. It is considered to be a form of cognitive apprenticeship, where learning occurs via social interactions that focus not only on transferring information but also on learners’ needs and understanding (Dennen, 2004). Passey (2014, p.29) explains that, when scaffolding is employed, “a teacher provides a series of steps, or a number of interim stages or frameworks, to help learners approach an activity in a structured way”.

Collins, Brown, and Newman (1989) view scaffolding as a critical element of coaching, supporting the learner with the assistance and reminders needed in order to complete a task. According to the scholars, effective scaffolding provides students with the exact amount of support they need to complete the given task - no more, no less; the educator needs to gradually withdraw from

the process, as the aim is to progressively build learners' confidence in respect to mastering the required skills. In essence, scaffolding is a metaphor for a structure which, similarly to a real, physical scaffold, is placed to temporarily support a building during construction, but is gradually removed piece by piece as the construction moves to its end. Nevertheless, Dennen (2003) argues that for this learner-centred technique this is not a very successful metaphor, as, within an educational context, the effectiveness of scaffolding lies on its flexibility to adapt according to the needs of students.

4.1.3.7 Questioning

Passey (2014, p.29) describes this strategy as "a teacher asks questions, and elicits responses from learners, either to closed or to open questions". It can be argued that questioning is a straightforward term, referring to simply asking questions, and therefore no clarifications are needed. Nevertheless, within an education context, effective use of this technique involves Socratic questioning, a widely accepted and powerful strategy, which has the potential of promoting learners' critical skills by triggering them to generate contemplative questions (Yang, Newby, & Bill, 2005). The scholars also explain that this method allows the educator to inquire on a given theme using a series of thought-provoking questions - rather than directly delivering factual information on the subject or providing straightforward answers to the questions.

In respect to computer-supported education, the lack of face-to-face interaction may be seen as a challenge to the effective implementation of

questioning; nevertheless, there is evidence that integrating Socratic questioning in a virtual learning environment is feasible, provided that appropriate technologies such as computer conferencing, text-based computer-mediated communication tools, asynchronous electronic discussion boards, etc. are employed (Yang *et al*., 2005).

4.1.3.8 Speculation

According to Passey (2014, p.29), this type of interaction occurs when "a teacher offers a scenario, together with different ideas about outcomes or implications". Davies (1993, p.15) defines speculation as "conclusion reached by abstract or hypothetical reasoning", and also as "contemplation, consideration or profound study of some subject". The scholar stresses the value of speculation as a pedagogical strategy and argues against the notoriety that frequently accompanies the term, either in a financial context, or in the context of the common use of the term that, with the addition of adjectives such as 'mere' or 'plain', brings a demoted connotation to the term.

Speculation involves deductive reasoning, i.e. deriving logically necessary conclusions from given premises, which rely on assumed shared knowledge; speculations therefore incorporate a certain risk, since they are derived from assumptions rather than verified facts. Parisi (2012) argues that although this risk should be acknowledged, the alternative reasoning forms also have flaws; she therefore contrasts speculative/deductive reasoning with induction and abduction. Induction involves drawing conclusions by generalising cases seen to cases unseen, hence useful but unreliable, as it can only be used to prove

a false inference - but not a true one. On the other end, abduction involves making a hypothesis regarding tracing an event to its possible cause - also unreliable, as it may lead to false explanations.

In an educational context, speculative reasoning may formulate new knowledge, as, drawing on assumptions based on what is known, it enables learners to shape new ideas and to come up with new ways of thinking (J. Ross, 2017).

4.1.3.9 Consolidation

Within an educational context, consolidation can be interpreted as “the process by which a new memory is converted into a form that is stable and long-lasting” (Merriam-Webster, n.d.). During consolidation, “a teacher reviews a previous topic or activity, exploring the extent to which learners appear to have remembered details or grasped concepts” (Passey, 2014, p.29). As a lesson phase, consolidation follows the ‘acquisition’ phase, during which learners add to their short-term memory new information received from educators and/or instructional resources. Learners can then consolidate learning by reviewing and actively engaging with the new material; this consolidation phase facilitates transferring of the new information from short-term to long-term memory (Hattie & Donoghue, 2016).

Consolidation involves reviewing of the new material covered during a lesson, aiming at reinforcing learning; it typically occurs at the end of the lesson, as opposed to revision, whose purpose is primarily to remind learners, and which

usually occurs after a series of lessons (British Council, n.d.). During the consolidation lesson stage, educators revisit the lesson outcomes; they encourage learners to practice the new skills and knowledge they acquired during the lesson, and also to ask questions in order to clarify the new lesson concepts. As an educational strategy, consolidation facilitates information retention, while promoting learner confidence. Some representative examples of consolidation types include question-and-answer sessions, lesson summaries and interactive quizzes (Twinkl, n.d.).

4.1.3.10 Summarising

Summarising is a "method that draws together the main points of a learning experience to reinforce the grasp of key concepts" (Reigeluth & Carr-Chellman, 2009, p.38). Passey (2014, p.29) explains that, when summarising, "a teacher pulls out key points, messages, or ideas, providing an overview as a summary of a topic or activity". According to Collins *et al.* (1989), summarising supports monitoring and evaluation of students' comprehension, and it promotes self-diagnosis, as learners have the opportunity to self-assess their learning by attempting to put together the most significant points of the learning material.

Summarising is considered as one of the key teaching strategies employed by educators acting as facilitators, applicable in both the traditional, face-to-face setting, and the e-learning one (Ellis *et al*., 2009; Garrison, 2003). In alignment to this view, Rule (2006) states that an essential benefit of summarising is that it may promote authentic learning. It is noteworthy to point

out that electronic and online resources may increase the efficiency and effectiveness of summarising (Kanuka, 2002).

4.1.3.11 Initiating/guiding Exploration

Passey (2014, p.29) explains that this type of interaction occurs when “a teacher introduces a topic or activity, and indicates possible ways to explore, with ideas of how to begin or approaches that might be taken”. As a teaching strategy, exploration involves guiding students towards achieving one or more general goals, while at the same time encouraging them to explore, discover, and complete smaller goals in the process; as the interests of students vary, each learner may pursue different smaller goals. A key element of this strategy lies in guiding each learner to identify their own interests and therefore their own goals - revising the overall general goals is also quite common in successful exploration (A. Collins *et al*., 1989).

4.1.3.12 Evaluating learners’ responses

Evaluating learners’ responses involves providing feedback to learners related to their responses, by pointing out specific elements regarding not only the commendable aspects of these responses but also potential areas of improvement. This strategy allows educators to explore not only what it is that students learned, but also how they eventually gained this learning experience; educators can therefore adapt their learning approaches according to the feedback they get from this evaluation, in order to better accommodate diversity in student needs (Passey, 2019).

Passey (2014) explains that this form of evaluation can be regular or on an ad-hoc basis and it can be done at the end of an activity and/or throughout the activity, as the feedback can be either summative or formative - or both, rapid or extensive, and it can take more than one form, such as a score or a comment. It is important to point out that this evaluation can also take the form of self- or peer-evaluation. From the students' points of view, this strategy enables them to recognise their own achievements, promoting learners' self-confidence and independent learning.

Technology can play a significant role in facilitating this strategy - for instance, educators may employ online tests that can be graded automatically providing immediate feedback to students, who usually perceive digital resources as more neutral compared to traditional, face-to-face media; this automated feedback can also provide valuable insight to educators, in respect to learners' progress and performance. In addition, the use of virtual learning environments (VLEs) enables students to submit assignments that will be received and evaluated in a more detailed manner by educators - the actual feedback may be communicated to the students again via the same electronic platform (Passey, 2014). Some scholars bring empirical evidence about the value of such electronic resources in respect to evaluating learners' responses; for example, a case study of Ruiz and Fandos (2014) demonstrates the role of a tutoring virtual space for monitoring and evaluating students' learning process throughout their university studies. The same scholars also highlight the lifelong learning value of the electronic portfolio (e-portfolio), stated as an ideal tool for capturing student progress and promoting

reflective and critical thinking, as learners can observe and contemplate on their own progress. Similarly, Walker *et al.* (2012) and Walker, Voce, and Jenkins (2018) bring evidence regarding the use of e-portfolios as digital repositories of students' work, which are catalytic to the evaluation of students' responses in respect to the authenticity of the latter.

4.1.4 Step 4: Identify the Appropriate Educator Modes

After identifying the learning activities as indicated in step 3, the next step would be to select the most suitable educator mode for each one of these activities; such educator modes include teacher, tutor, facilitator, and guide. Each one of these modes assumes a different role for the educator; depending on the context, educators can deploy the mode they deem as the most appropriate. To avoid misinterpretations of the four terms, a brief presentation of these modes follows.

4.1.4.1 Teacher Mode

The conventional teacher mode typically involves a traditional face-to-face classroom setting in which the educator explains a specific topic, usually in the form of a lecture (Passey, 2019). According to Neville (1999), a teacher is frequently seen as a resource for information on a particular subject. This mode is commonly regarded as transmissive, as all students receive and record the same factual information and explanations that are passed on by the educator during the allocated class time - no customisation can be implemented, and the teacher has no, or minimal, personal interaction with

students on an individual basis. The main emphasis is placed on the material taught, and the teacher can evaluate students' progress and provide students with feedback only after they complete specific summative assessments (Wood & Tanner, 2012).

4.1.4.2 Tutor Mode

According to Passey (2019), the tutor mode would be ideal in the case of a particular activity or training that needs to be completed by one or a few students, as a tutor works with the students. An important feature of this mode is the number of students tutored, which is typically small - although larger numbers are not excluded from the mode. In respect to online tutors in particular, Passey (2014) states that they are not necessarily personally acquainted with their students; a feature that may prompt learners to favour the educational setting as being seen as 'neutral'.

Ruiz and Fandos (2014) stress the importance of tutoring in a higher education setting. According to these scholars, the main roles of a tutor include: to ease the students' integration into the academic institution; to help students in their academic work; to facilitate student problem-solving in both an academic and an extracurricular context; to help students advance both academically and personally; and to support students in their transition to the professional world. It is important to state that each academic institution may customise these roles to better fit their institutional culture.

Ruiz and Fandos (2014) also propose the following three forms for the meetings between tutors and students, depending on the number of students to be tutored at a given time: individual tutoring, to provide one-to-one support to one student; group tutoring, for a small group of students; and seminars, for larger groups - but certainly smaller than a full class size.

Lepper and Woolverton (2002, p.145) have identified the key features of the most effective tutors, which they used to develop “the INSPIRE model of tutoring success”; the name of the model is an acronym formulated by the first letter of each one of the seven key characteristics of expert tutors. Wood and Tanner (2012, p.5) summarise these seven characteristics in a table, associating each one with the respective benefit for students; this table is reproduced here as Table 4-1.

Characteristics and Behaviours of Expert Tutors	Results for Tutees
Intelligent: Superior as well as pedagogical content knowledge	Difficulty of questions optimally matched to students’ levels of understanding
Nurturant: Establish and maintain personal rapport and empathy with students	Feeling accepted, supported, and free to explain their thinking
Socratic: Provide almost no facts, solutions, or explanations, but elicit these from tutees by questioning	Constantly thinking, doing, and responding

Characteristics and Behaviours of Expert Tutors	Results for Tutees
Progressive: Move from easier to progressively more challenging cycles of diagnosis, prompting towards a solution, and posing of a new problem	Moving in small steps to higher competency through deliberate practice
Indirect: Provide both negative and positive feedback by implication; praise solutions, not the student	Working in a non-judgmental atmosphere
Reflective: Ask students to articulate their thinking, explain their reasoning, and generalise to other contexts	Gaining insight into their own thinking through metacognitive reflection
Encouraging: Use strategies to motivate students and bolster their confidence (self-efficacy)	Experiencing productive learning and gaining confidence in their abilities

Table 4-1: "The INSPIRE model of expert tutoring and results for tutees" (Wood & Tanner, 2012, p.5)

4.1.4.3 Facilitator Mode

The facilitator mode would be ideal in the case of an assigned project, with the educator acting as a facilitator regarding the overall project management. A facilitator is expected to assist learners to employ their existing knowledge and assets towards completing the project (Passey, 2019). Frequently related to problem-based learning, the typical responsibilities of a facilitator can be summarised in the following elements: (1) climate setting: the facilitator is

expected to explain their role to the students, to help them get to know each other, and to guide them towards becoming self-directed learners; (2) planning: prepare the required setup and plan the tasks and the activities to be assigned to students; (3) designing needs for learning: help students self-evaluate their knowledge in respect to the required learning outcomes, leading to identification of their own personal learning needs; (4) setting goals: help students determine personal goals in order to fulfil the identified needs; (5) designing a learning plan: facilitate students to set up their own learning strategies and plans, within the context of the assigned project; (6) engaging in learning activities: consider the degree of involvement of the facilitator in the overall learning process, as opposed to the tasks to be undertaken by the students, either individually or in groups; and (7) evaluating learning outcomes: provide meaningful feedback to the students, aiming to assist the students' evolution as self-directed learners (Neville, 1999).

In respect to the use of this type of interaction in an online or blended environment, Passey (2014) points out the critical role of facilitators by drawing evidence from Stephen *et al*.'s (2011) study on facilitating online groups, in which it is reported that "facilitators were challenged to bring emotional process and immediacy to online groups, and devised creative 'work-arounds' to overcome limitations of the modality" (Stephen *et al*., 2011, p.838).

4.1.4.4 Guide Mode

An educator acting as a guide is typically available to support the students primarily if they require assistance. This mode would also be ideal for a group field trip, such as for a visit at an archaeological site or at the premises of a business (Passey, 2019). In essence, the role of a guide is similar to that of a counsellor's, providing help when the learners request it, and aiming to empower learners and guide them towards understanding and completing the required changes in the process - such as changes in behaviours, perspectives, insights, etc. (PACFA, 2013). McLeod (2008) brings evidence regarding positive impact of counselling on commitment and satisfaction, along with significant alleviation of stress and anxiety. Drawing from a comprehensive collection of studies on workplace counselling, the scholar focuses on counselling's interventional potential in respect to workplace stress and wellbeing, and provides a summary of the essential features of counselling. Attempting to adapt these to fit the educational context, the following list of features can be considered for an educator-guide:

- The educator does not initiate counselling interventions, unless students voluntarily ask for the guide's assistance.
- The guide has to be responsive to the individual needs of each learner - or of the learners' group, adapting the requested assistance accordingly.
- The guide's interventions aim to trigger changes in learner's behaviour and actions, so as to empower the learner and to promote independent learning.

4.1.5 Step 5: Identify the Appropriate Technologies

The final step would be to consider the technologies that may best support the identified learning activities, given the associated interaction type and educator mode. There is more than one way to categorise technology resources for educational use; Passey (2014, 2017, 2019) recommends the following grouping, based on the target users, the focus of the support, and the modality (in or out of class): “topic-specific resources and software, curriculum-wide learner-centred software, curriculum-wide tutor-centred software, or online learner support” (Passey, 2019, p.11).

4.1.5.1 Topic-specific Resources and Software

This category includes resources and software that are designed to support learning of a particular topic or content area. These tools are typically selected by educators, and they may be used by one or a few students, either with or without supervision by an educator or a peer, so they are suitable for both in- and out-of-class settings. Various technologies can support these tools, from desktop computers with optical drives to mobile devices connected to the Internet. There is a wide variety of tools in this category, such as computerised interactive algebra exercises, online games involving computer programming, simulation platforms, virtual labs, or computerised tutorials (Passey, 2014, 2017).

There is much evidence in the literature regarding the effectiveness of such topic-specific resources; for instance, a study by Kaveh (2012) correlates

such tools to creative and dynamic learning, while the findings of Suleman (2011) reveal that the use of such topic-specific tools promotes motivation, participation, and engagement of students, along with effective teaching. Similarly, regarding the use of computer simulations in particular, Rutten, Van Joolingen, and Van Der Veen (2012, p.136) reported that “their use in the science classroom has the potential to generate higher learning outcomes in ways not previously possible”.

4.1.5.2 Curriculum-wide Learner-centred Software

This group includes a wide range of - typically online - tools that are designed to support a whole curriculum area. The intended users for these tools are primarily students, although occasionally these may be employed by educators, too. Similarly to topic-specific resources (see section 4.1.5.1), educators may select which of these resources they consider useful to assign to students – however, these can address a wide range of topics instead of just a specific one. Nevertheless, it is also possible for the students to select the specific resources they wish to use - for example, to support their revision needs. These tools do not necessarily require supervision, so they can support both a traditional classroom setting and distance or blended modalities. Representative examples in this category are ILSs, computer assisted instruction (CAI), and MOOCs (Passey, 2014, 2017).

Once more, there are many studies linking the use of such tools with educational benefits; for example, with respect to MOOCs, McAuley, Stewart, Siemens, and Cormier (2010) point out that their collaborative nature renders

them ideal for an educator to share their expertise with the maximum possible number of learners, but without having to provide individual feedback to each student. Contrastingly, one of the identified benefits of CAI is precisely its potential of providing immediate feedback for each individual student (Metiri Group, 2006).

4.1.5.3 Curriculum-wide Tutor-centred Software and Resources

Like the curriculum-wide learner-centred tools already described (see section 4.1.5.2), the focus of the curriculum-wide tutor-centred software is a whole curriculum area; however, these tools are designed to facilitate teaching - so the target users here are educators. These resources may require special hardware, such as computer networks or interactive whiteboards, and they support curriculum-related activities that can be undertaken by students, primarily in a face-to-face in-class environment (Passey, 2014, 2017).

Student response systems fit in this group; these are typically used in combination with display technologies that enable information from a computer to be presented to an entire class (Roblyer, 2016). Such systems typically present to a group of students a game-like set of questions, prepared in advance by the educator; student answers are interactively polled via wireless clicker devices, or by special mobile or desktop applications such as Kahoot! and Socrative. Studies have shown that such tools increase student engagement and promote critical thinking and problem-solving skills (Dellos, 2015).

4.1.5.4 Online Learner Support

Online learner support tools are designed to support either individual students or groups of students, by providing synchronous or asynchronous online communication with educators or peers, aiming to facilitate online discussions and collaborative work. Typically, these tools include links to online related-content resources and websites (Passey, 2014, 2017).

Given the characteristics of this category, representative examples here include various online collaborative tools, such as electronic forums, blogs, wikis, collaborative presentation tools, etc.

Passey (2017, 2019) exemplifies in a tabular format some of the ways that digital technologies can be employed to support the ‘new’ learning forms; an integration of the tables in Passey, (2017, p.18 and 2019, p.8) resulted in Table 4-2. Similarly, the scholar cross-tabulates the interaction types with the pedagogical modes, while clarifying that the roles of tutor, facilitator, and guide can also be utilised in an online - and therefore blended – setting too; this table is reproduced here as Table 4-3 (Passey, 2019, p.9).

Digital technology resource category	Supporting 'new' ways of learning	Technology examples
Topic-specific resources and software	PBL, AL, SL, TEL, ML	Specific online texts and literature Specific online videos and activities Pointers to online resources in other repositories
Curriculum-wide learner-centred software	PBL, TEL, ML	Moodle platform for drawing together all key interactions Discussion fora
Curriculum-wide tutor- centred software	PBL, AL, SL, TEL, CSCL, ML	Access to tutor resources is available to all students Tutor-prepared video clips Online assignment upload Online feedback
Online learner support	PBL, DL, SL, TEL, NL, CSCL, ML	Tutor online summaries Tutor-highlighted resources and individual as well as group feedback

Table 4-2: "Technology resource categories and examples of technologies supporting 'new' ways of learning" (Passey, 2019, p.8)

Type of interaction	Teacher	Tutor	Facilitator	Guide
Instruction	✓	✓		✓
Explanation/illustration	✓	✓	✓	
Direction	✓			✓
Demonstration	✓	✓		
Discussion		✓	✓	✓
Scaffolding	✓	✓	✓	✓
Questioning	✓	✓	✓	✓
Speculation		✓	✓	
Consolidation	✓	✓	✓	
Summarising		✓		✓
Initiating/guiding exploration		✓	✓	✓
Evaluating learners' responses	✓	✓	✓	✓

Table 4-3: "Types of interaction related to pedagogical modes of online educators" (Passey, 2019, p.9)

It is evident that Passey's (2019) model is clear and comprehensive, explicitly stating the steps that can be followed in order to implement a blended learning provision within the context of a higher education setting. This model has been explored in this case study, and the detailed methodology that was followed is discussed in the next chapter.

Chapter 5 Research Design and Methodology

The research conducted for this thesis was designed as a qualitative single exploratory case study, employing thematic analysis on the collected data. It should be mentioned that other methodologies were also considered; for example, two candidates that also seemed valid were design-based research and phenomenology. The former was eventually not chosen, as it became clear that the scope of this research, as guided by the research questions, was to explore the case in hand, without going through design cycles - which is the fundamental aspect of design-based research. In respect to phenomenology, it would certainly support the analysis of the participants' experiences, but it would steer the research towards exploring the module under investigation as a phenomenon, and not as the intended overall structure for development accommodating perceptions, including perceived advantages and disadvantages (Cohen, Manion, & Morrison, 2018).

Abiding by the recommendation of Cohen *et al.* (2018), who point out the significance of discerning between research design, methodology, data collection, and data analysis, this section will attempt to explain the rationale behind the chosen design aspects, and then present the steps conducted for this study.

5.1 Rationale

Research design refers to the logic that connects the research questions to the collected data, the findings, and the conclusions; there is a wide variety of

research designs, such as experiment, survey, case study, etc. (Yin, 2009). Contrastingly, research methodology refers to the approach - or combination of approaches - employed in order to accommodate the chosen research design; typical methodologies include qualitative, quantitative, or mixed approaches. Finally, the data collection and analysis involve the instruments utilised in order to respectively collect and analyse the research data; data collection examples include questionnaires, interviews, focus groups, etc., while data analysis examples may use statistical tools such as SPSS or software for qualitative analysis such as NVivo or Atlas.ti. These instruments are not selected arbitrarily; rather, it is the combination of the chosen research design and methodology that guides the choice of these instruments (Cohen *et al*., 2018).

In respect to this thesis, the research design employed is a case study, following a qualitative methodology; thematic analysis was conducted on the data collected via interviews and focus groups.

The following sections will present the rationale for the choice of the above-mentioned research design, methodology, data collection and analysis.

5.1.1 Research Design: Case study

According to Yin (2009), the choice of a research design relies on three conditions, i.e. the form of research question, the degree of the researcher's control over behavioural events, and the degree of contemporariness of events. The scholar suggests that a case study design may be followed when

the research question is of a ‘how’ or ‘why’ form; when the researcher does not have to exercise any control over behavioural events; and when the focus is on contemporary rather than historical events. Within the context of this thesis, it can be safely assumed that all three conditions are met: the focus of the research question is how the potential transition to blended learning can be achieved for the ‘Introduction to Information Systems’ module; there was no requirement for the researcher to control any behavioural events, as the participants were simply asked to discuss their perceptions and views in respect to a potential transition of the module to blended learning; and the focus is on a - very - contemporary event, as it involves implementation of blended learning, which, as already discussed, is considered a ‘new’ way of learning.

There are many definitions for case study research design; a highly cited and widely used definition is provided by Yin (2009, p.18), who characterises case study as “an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident”. Eisenhardt (1989, p.534) provides a similar, yet more compact, definition, stating that a case study is “a research strategy which focuses on understanding the dynamics present within single settings”, while Blatter (2008, p.68) states that “A case study is a research approach in which one or a few instances of a phenomenon are studied in depth”. According to Woodside and Wilson (2003, p.493), case study research can be defined as “inquiry focusing on describing, understanding, predicting, and/or controlling the individual (i.e. process,

animal, person, household, organization, group, industry, culture, or nationality)".

These definitions certainly apply here, as this study is an empirical inquiry, that investigates the potential transition of an actual course module to blended mode, focusing on describing and understanding the perceptions of the involved instructors and students. In addition, Cohen *et al.*, (2018) point out that a shared aspect between most case study definitions seems to be a reference to a study of a specific instance of something. This aspect is certainly present in this study, since the investigation conducted involves understanding and describing the perceptions of the participants in respect to the potential conversion to blended learning of a *specific* module ('Introduction to Information Systems'), of a *specific* department (Management Information Systems), of a *specific* college (College X). Following Yin's (2009) guidelines, the necessary background information and documentation that relate to the context of this case study were provided in section 1.2.

Concluding the rationale of designing this thesis as a case study, it should be added that it encompasses the key case study characteristics identified by Hitchcock and Hughes (1995, p.317):

> it is concerned with a rich and vivid description of events relevant to the case; it provides a chronological narrative of events relevant to the case; it blends description with analysis of events; it focuses on individual actors or groups of actors, and seeks to understand their perceptions of events; it highlights specific events that are relevant to

the case; the researcher is integrally involved in the case, and the case study may be linked to the personality of the researcher.

The events described and analysed within the context of this case study are the participants' perceptions and experiences regarding the 'Introduction to the Information Systems' module's transition to blended learning, highlighting the advantages and challenges as perceived by the participants; moreover, I am personally involved with the module under investigation, as I am one of its instructors.

Yin (2009) identifies three main categories of case studies, in respect to their outcomes: exploratory, descriptive, and explanatory or causal. Exploratory case studies have an initial rationale and direction, which may or may not be proven true after the study is over; Cohen *et al*. (2018) explain that it is possible for such studies to serve as pilots to other studies or research questions. Descriptive case studies provide narrative accounts of events, while explanatory or causal case studies test theories by explaining and evaluating them. Merriam (1998) refers to three similar categories: interpretative, which explores initial assumptions by inductively generating conceptual categories, therefore matching Yin's exploratory type; descriptive, which corresponds to Yin's respective homonym type; and evaluative, which tests and explains a theory, which matches Yin's explanatory type.

Given the nature of this case study, it is considered to be an exploratory (interpretative) type, as it involves the development of conceptual categories of the perceptions of the involved actors in an attempt to explore the potential

transition of the ‘Introduction to Information Systems’ module to a blended mode.

In respect to the choice of a single rather than a multiple case design, Yin's (2009) rationale was followed. According to (Yin, 2009), the choice of a single case study design is justified if one or more of the following conditions are met, i.e. if it represents: (1) the critical case in testing a theory under investigation; (2) an extreme or unique case; (3) a representative, typical, average case; (4) a case with a revelatory purpose; or (5) a longitudinal case, which involves investigating the case over more than one time point. Moreover, Yin (2009) classifies case studies as holistic, i.e. with a single unit of analysis, or embedded, i.e. with more than one unit of analysis. Within the context of this thesis, the case of the ‘Introduction to Information Systems’ module is considered to be a representative, typical case of a module of College X, with a single unit of analysis being the perceptions of the involved actors; consequently, the single holistic case study design was chosen.

It should also be added that employing a case study research design is not uncommon in educational research; on the contrary, there is a vast number of educational case studies. Some representative examples of highly cited case studies from the wider area of educational research are the ones by Sharples *et al.* (2006) on mobile learning, by Benson (2002) on online learning, and by Liaw (2008) on the effectiveness of Blackboard in respect to e-learning - the list is vast. Similarly, there are numerous case studies that, similarly to this

thesis, explore aspects of blended learning; examples include the ones by Nazarenko (2015) and by Lopez-Perez *et al.* (2011).

5.1.2 Research Methodology: Qualitative

Depending on the methods the researcher chooses to employ, the case study design can serve either a qualitative or a quantitative inquiry, or a combination of the two. The selected methods are also related to the type of data used in the study - structured, quantitative data or unstructured, qualitative ones - and therefore to the tools employed for data collection and analysis (Cohen *et al*., 2018; Stake, 2005). Comparing qualitative to quantitative methods, Pistrang and Barker (2012) point out that the main advantages of the former include: more in-depth analysis of data, which allows deeper investigation in respect to nuances and contradiction; investigation of personal meanings; support generation of theories from exploratory work in under-theorised areas; balancing the researcher-participant relationship as participants may freely express their experiences; and, they do not exclude data from disadvantaged populations.

According to Stake (2014, p.15) a qualitative study is ‘personalistic’, as “it seeks people’s points of view, frames of reference, value commitments. Often issues are emic (emerging from the people) more than etic (brought by researchers)”. Aligned to this, Merriam (2009) recommends the qualitative approach for studies that investigate how individuals perceive specific dimensions of a situation in a given context.

Drawing from the above and given the focus of this study, i.e. exploring the perceptions of participants, the nature of the collected data - i.e. perceptions, views, and experiences - guided the choice of a purely qualitative methodology for the data collection and analysis, which is quite common in the field of educational research; for instance, Abello (2018) justifies his choice of qualitative case study design for exploring teachers' perceptions by bringing literature and empirical evidence to point out that quantitative studies are not as effective as qualitative when the data to be collected and analysed are people's perceptions. Other indicative examples of qualitative case studies in education include those by Benson (2002) on online learning and by Surber (2016) on e-learning.

Aligned to the choice of a qualitative methodology for this study, the tools employed to collect the data were interviews and focus groups, which are commonly used for qualitative case studies and are suitable for recording views and perceptions (Yin, 2009). The next section further justifies the choice for these tools.

5.1.3 Data Collection: Interviews and Focus Groups

The data for this case study were collected using interviews and focus groups, which, according to Cohen *et al*. (2018) are commonly used to gather data within a case study context.

According to Kvale (2006, p.483), an interview is "a meeting where a reporter obtains information from a person, […] a meeting with another person to

achieve a specific goal, and more generally, as a conversation with a purpose". The scholar points out that the interview serves as "an instrument for providing the interviewer with descriptions, narratives, and texts, which the researcher then interprets and reports according to his or her research interests" (Kvale, 2006, p.484). Cohen *et al*. (2018) share Kvale's notion regarding the interactional nature of an interview, stating that an 'inter-view' is essentially an interchange of people's views on a specific topic; this interchange is neither subjective nor objective, but rather intersubjective, as the interviewer and the interviewees - usually just one - express their perceptions of the context under investigation. Consequently, knowledge is essentially co-constructed during interviews. Comparing interviews to surveys, Cohen *et al*. (2018) praise the flexibility of the former in respect to data collection, as interviews not only allow for multi-sensory data to be collected but, due to their real-time nature, they also enable the interviewer to explore issues in-depth by eliciting further answers from the interviewees. Nevertheless, the same researchers also acknowledge that, contrasted again to surveys, interviews have potential limitations; they hence state that interviews are more time consuming, they may be more prone to interviewer bias, their effectiveness may be subjected to potential fatigue of the interview, interviewees may feel uncomfortable, and ensuring anonymity can be more challenging.

Focus groups are considered a special form of a group interview which enables participants to interact not only with the interviewer but also with each other; a focus group hence yields not only the individual views of each

participant, but also - and primarily - the collective, group one (Cohen *et al*., 2018). Compared to individual interviews, focus groups enable the researcher to observe group interaction on the topic under investigation, revealing differences and similarities in the participants' perceptions; on the other hand, the individual data yielded are not as detailed as individual interviews (Morgan, 1997).

Taking into consideration the above, along with the context of this case study, interviews were considered an appropriate instrument to acquire the instructors' views and perceptions. The rationale behind this choice was based primarily on the need to collect in-depth information in respect to the instructors' perceptions on the subject. Moreover, the relatively small number of instructors (nine) allowed for the required time investment for each interview.

Data from students and from instructional designers were collected via focus groups, as the emphasis there was on the collective perception of each class - for students - and of the instructional designers as an entity; moreover, compared to interviews, focus groups were quite efficient time-wise.

Both the interviews and the focus groups were semi-structured, abiding by the 'fitness for purpose' recommendation of Cohen *et al*. (2018), suggesting that when the data to be collected have to do with personal views and qualitative, in-depth information, a less structured scheme is more effective. Consequently, the participants of this study were provided with a general question regarding how they viewed the potential transition of the module to a

blended mode, and they were encouraged to express their perceptions in respect to specific elements of the module that they would/would not like to go online, advantages, and challenges; further questions emerged during subsequent discussion. This protocol is also aligned to Patton's (2002, p.342) "interview guide approach", which suggests that the interviewer starts by presenting the issues to be discussed in outline form; this approach allows the interviewer to be in control of the use of time during the interview, and also to create a conversational atmosphere which promotes formulation of further questions during the course of the interview. Patton (2002) also points out that the 'interview guide approach' is also very effective for focus groups, as it enables the interviewer to ensure that the interactions stay focused on the topic under investigation, while encouraging the participants to share personalised views and perspectives.

Regarding the analysis of the collected data, the choice of thematic analysis is justified below.

5.1.4 Data Analysis: Thematic Analysis

Given the qualitative nature of this study, thematic analysis seemed to be an appropriate choice for the data analysis. According to Boyatzis (1998, p.4), thematic analysis "is a process for encoding qualitative information", and "not another qualitative method but a process that can be used with most, if not all, qualitative methods". Braun and Clarke (2006) praise the flexibility of thematic analysis, as it is not tied to a specific theory; rather, it can be used with any theoretical framework the researcher selects. Moreover, the scholars state

that even researchers with little or no experience in qualitative research may conduct thematic analysis without difficulty, as the process is relatively simple to learn and implement. Braun and Clarke (2006) also claim that thematic analysis is quite useful in research designs that include participants as collaborators, as is the case in this study. The same researchers, in a later publication, point out that thematic analysis "is a method for systematically identifying, organizing, and offering insight into patterns of meaning (themes) across a data set" (Braun & Clarke, 2012, p.57); the scholars explain that a key feature that differentiates thematic analysis from other qualitative processes is that it allows the researcher to focus on common themes *across* a data set, rather than analysing just one data item. They also point out that thematic analysis allows for a 'thick description' of a large data set, as it can summarise the key features while highlighting both similarities and differences across the data set. As the nature of this case study's data set called for identifying commonalities and differences across the perceptions of all participants, thematic analysis seemed ideal for this study.

Yet another aspect of thematic analysis that makes it appropriate for this case study is that it can inform policy development (Braun & Clarke, 2006), which is aligned to the aim of this thesis in respect to College X's blended learning policy.

It should be noted that thematic analysis is commonly used for similar qualitative studies in education; to illustrate, Abello (2018) employed thematic analysis in his research regarding blended learning and teachers' self-

efficacy, while Surber (2016) used it in her case study exploring e-learning factors that influence higher education strategies in respect to employee training.

5.2 Description of the Methodology Followed

As already stated in section 1.2.2, the ‘Introduction to Information Systems’ module of College X is scheduled in four academic terms, i.e. Fall and Spring semesters and Summer Sessions I and II. In Fall and Spring semesters, the module runs with multiple sections, usually eight to eleven, each one scheduled at a different time slot, while in each one of the Summer sessions there is usually only one section of the module. In the Management Information Systems department, there are nine instructors in total who teach the module. Each one of these instructors also teaches other modules, so depending on their overall teaching load it is possible for an instructor to teach more than one section of the ‘Introduction to Information Systems’ module throughout the academic year - and quite frequently during the same term, as is commonly the case for Fall and/or Spring semester. Moreover, as the module also has a laboratory component, it is possible for a section to have a different theory and laboratory instructor.

5.2.1 Data Collection

Given the qualitative nature of this study, purposive sampling was used. According to Cohen *et al*. (2018), purposive sampling is considered a key element in qualitative research; compared to probability sampling it provides

less breadth but greater depth to a study, therefore accommodating the qualitative requirement for ‘thicker’ data. Given the purpose of this study, the participants were chosen based on their role at College X, abiding by the ‘criterion sampling’ form of purposive sampling. Hence, data were collected from three different groups of participants, i.e. instructors, students, and instructional designers. Instructors were selected on the basis of teaching the module under investigation. Following Cohen *et al*. ’s (2018) complete collection sampling’ type of purposive sampling, all nine instructors of the module were recruited. In respect to the students’ group, ‘convenience sampling’ was employed; for purposes of availability my own two classes of the module were recruited. In addition, to minimise potential bias related to my personal involvement with the study, a class of another colleague was also used, and that colleague conducting the focus group. For the instructor, existing student relationship made it easier for students to open up, as an atmosphere of trust and respect was already established. In all three cases, students were informed that their participation was optional, that they could opt-out at any time, that their participation did not affect their grade in any way, and that there were no ‘correct’ responses. Students were encouraged to providing their own views and feedback, in an uncensored way; the aim was to make them realise that their input was highly valued, and also to make them feel actively involved in the process of improving the module.

The ‘complete collection sampling’ was employed in the case of instructional designers of College X, and all three designers were recruited. The reason for adding this group to the participants’ pool was because of their expertise in

the subject of blended learning, serving the purpose of ‘knowledgeable people’ - a common practice with purposive sampling according to Cohen *et al*. (2018). Samples of the collected data are available in Appendix I.

The aforementioned choices regarding data collection were also guided by my role as an insider researcher and my epistemological position, which in turn raised expectations for the findings to present pragmatic suggestions for their incorporation into the overall teaching and learning experience (see also section 1.1).

All data were collected in the period between April and June 2019, i.e. the end of Spring semester and Summer Session I; in Spring semester 2019, there were in total ten sections of the module, with an average of twenty students each, while in Summer Session I 2019, there was as usual only one section of the module, with fourteen students. Prior to the data collection, all necessary ethics forms and related documents were submitted and approved by the ethics committees of both Lancaster University and College X (see Appendix II for the Participant Information Sheets).

5.2.1.1 Data from Instructors

Regarding the instructors’ data, each of the nine instructors of the ‘Introduction to Information Systems’ module was interviewed at the end of Spring semester 2019, with each interview lasting between thirty and sixty minutes. All interviews were conducted in a quiet room at the College, reserved for that purpose, in which only the interviewer and the interviewed

instructor were present. I personally contacted all nine instructors to brief them about the study; after they all kindly agreed to participate, I provided them with the participant information sheet and the consent form which they all signed, and an interview date and time was scheduled with each colleague. The same protocol was used for all interviews, with the starting question being “What do you think about a potential transition of the ‘Introduction to Information Systems’ to blended mode?” - the complete set of questions used is in Appendix III. All interviews were audio recorded.

5.2.1.2 Data from Students

Students’ data were collected from a total of fifty students from three sections of the module, using a focus group for each section. The same starting question used for the interviews was also employed in all focus groups. Forty-five minutes of the regular class time of each section was allocated for each focus group during the last week of classes, and all three focus groups were audio recorded. Two of these focus groups were conducted by me at the end of the Spring semester 2019, with the students of my own two sections of the module, which will hereafter be referred to as ‘section A’ and ‘section B’. The number of students present at the respective focus groups was nineteen out of the twenty registered students of section A, and all twenty students of section B.

In an attempt to minimise potential personal biases, instead of conducting the third focus group myself with my own students, I asked the colleague who was teaching the Summer Session I 2019 section of the module - hereafter

referred to as ‘section C’ - to conduct the focus group himself with his own Summer I students; eleven out of the fourteen registered students were present during that focus group.

5.2.1.3 Data from Instructional Designers

In addition to the views and perceptions of the module’s students and instructors, data from the three instructional designers of the College were also collected. Prior to the instructors’ interviews and the students’ focus groups, I conducted one fifty-minute focus group with all three instructional designers of the College; once more, the data were audio-recorded. The purpose of this focus group was twofold: first, to acquire the necessary information regarding the policies and procedures of College X in respect to blended learning modules and implementation; and second, to allow the instructional designers to share their own views regarding the potential transition of the ‘Introduction to information systems’ module; although the three participants were not subject matter experts, their expertise regarding the ‘new’ learning form was considered valuable, and their perceptions enriched the overall data pool. During the first part of the focus group the instructional designers provided information about the current situation at College X regarding blended learning modules and policies - this information is already described in section 1.2.1. Then, the same question that initiated the instructors’ interviews and the students’ focus groups regarding the potential transition of the ‘Introduction to Information Systems’ module was posed.

5.2.2 Data Analysis

As already stated, the analysis of the collected data was performed with thematic analysis, following the six-step framework suggested by Braun and Clarke (2006):

5.2.2.1 Step 1: Familiarisation with the Collected Data

Braun and Clarke (2006) suggest that, in qualitative data analysis, transcription should not be seen merely as a trivial process of transferring spoken words on paper, but rather as a key phase that enables the researcher to become more acquainted with their data. I therefore personally transcribed all audio recordings, creating a verbatim account of the participants' data; sample excerpts from the transcriptions can be seen in Appendix I. Then, I went through all transcriptions multiple times in order to familiarise myself with the data, adding notes of some initial ideas.

5.2.2.2 Step 2: Initial Coding

All transcripts were added to an NVivo 12 project, and the systematic generation of the initial codes of the data was performed through multiple iterations of reading the data. According to Boyatzis (1998, p.63), a code or 'unit of coding' in thematic analysis refers to "the most basic segment, or element, of the raw data or information that can be assessed in a meaningful way regarding the phenomenon". Working titles were used at this stage to name the codes.

Figure 5.1 visually represents this step, using a part of the interview excerpt appearing in Appendix I; two parts of the original quote were coded, so one code was created from the first part, while four different codes were linked to the second.

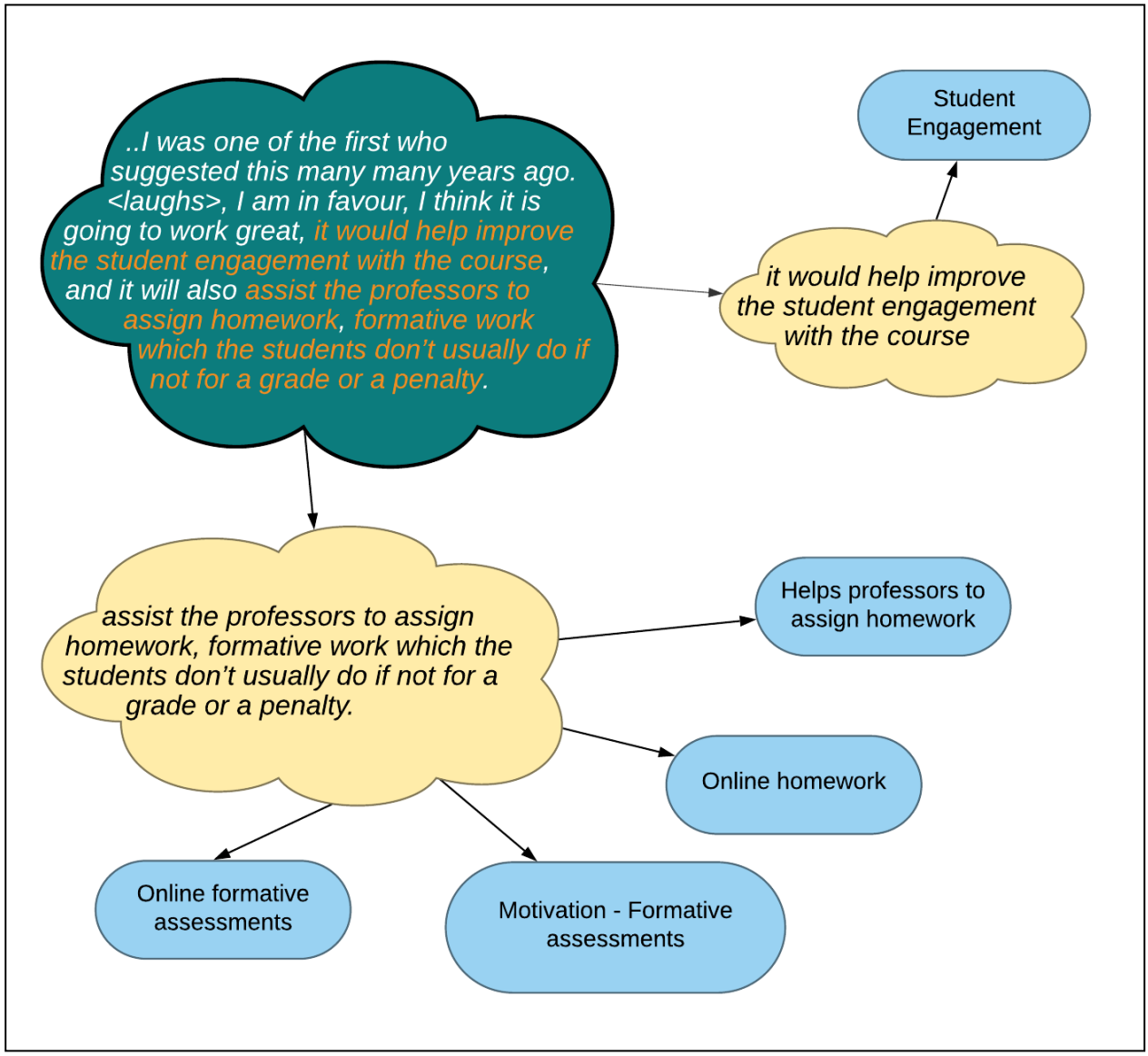


Figure 5.1: Initial Coding

5.2.2.3 Step 3: Grouping Codes into Themes

During this step, the coded data were organised into a collection of meaningful groups, with the purpose of forming overarching themes and subthemes. According to Braun and Clarke (2006), the process of grouping codes into themes may be inductive (data-driven) or deductive (theory-driven); in the former case themes depend on the data, and they are induced from the data in a bottom-up process, while in the latter, top-down case, data are coded taking into consideration specific questions related to the conducted research. Given the context of this case study and its guiding framework, this stage was both theory- and data-driven. For instance, the framework's first step suggested identification of the module's features that should remain face-to-face, so any codes referring to such features indicated by the participants were grouped into a 'face-to-face' theme. Nonetheless, this was not the only theme that emerged; additional themes surfaced, as data were not limited to the face-to-face elements of the module, but rather to the participants' perceptions of the potential transition of the module to blended mode.

Another decision that had to be made during this stage involved the level at which themes were identified. Boyatzis (1998) explains that themes can be identified either at a semantic, explicit level or at a latent, interpretative one. The first approach is effective when there is no need for the researcher to look beyond the participants' statements, so ideally the analysis involves interpreting the organised data patterns which explicitly describe the data

towards developing a theory. The second is used when the analysis goes beyond the semantic content of the data, searching for deeper connotations that lie beneath the spoken words, in an attempt to determine the actual meaning of the data; this approach is more aligned to the constructionist paradigm, as themes are developed interpretatively rather than descriptively. Within the context of this case study, although a small part of the analysis was conducted at the semantic level, primarily for the data that were quite explicit, the overall data analysis was largely interpretative, as it was important to go beyond the participants' words and understand the reasons that participants perceived something as such; for instance, students' statements regarding teaching of 'simple concepts' moving to the online mode of the blend had to be further analysed in order to understand what exactly in terms of the specific nature of these concepts justified the students' preference for not needing a face-to-face classroom interaction for these.

After multiple iterations, this phase ended with a compilation of candidate themes and subthemes, each one with a set of codes. Figures 5.2 and 5.3 demonstrate two iterations of this process, using the same example of the previous step; during the first iteration the codes are assigned to broader themes, in this particular case 'Advantages' and 'Online Features', while in the second subthemes emerge.

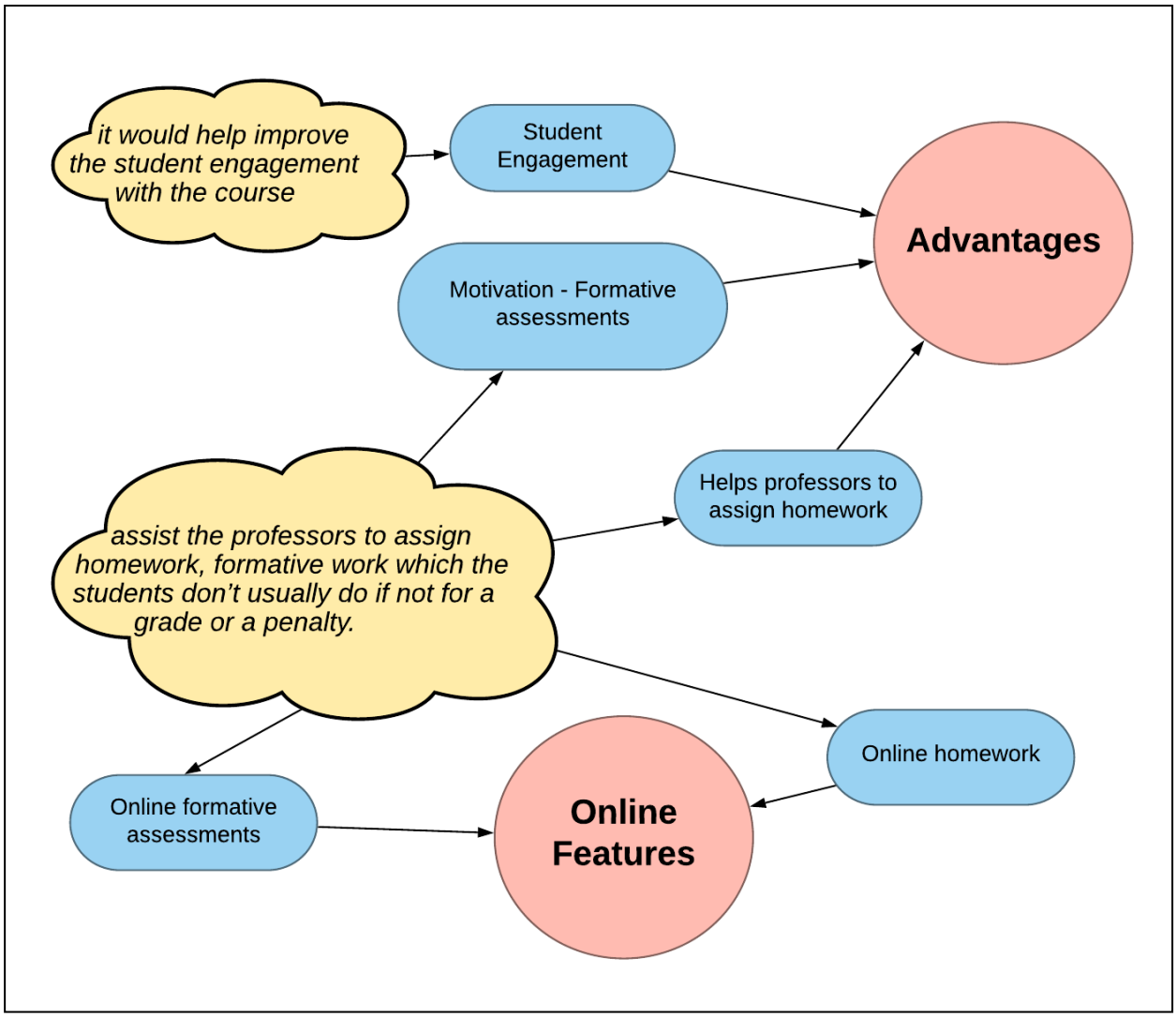


Figure 5.2: Grouping Codes into Themes (A)

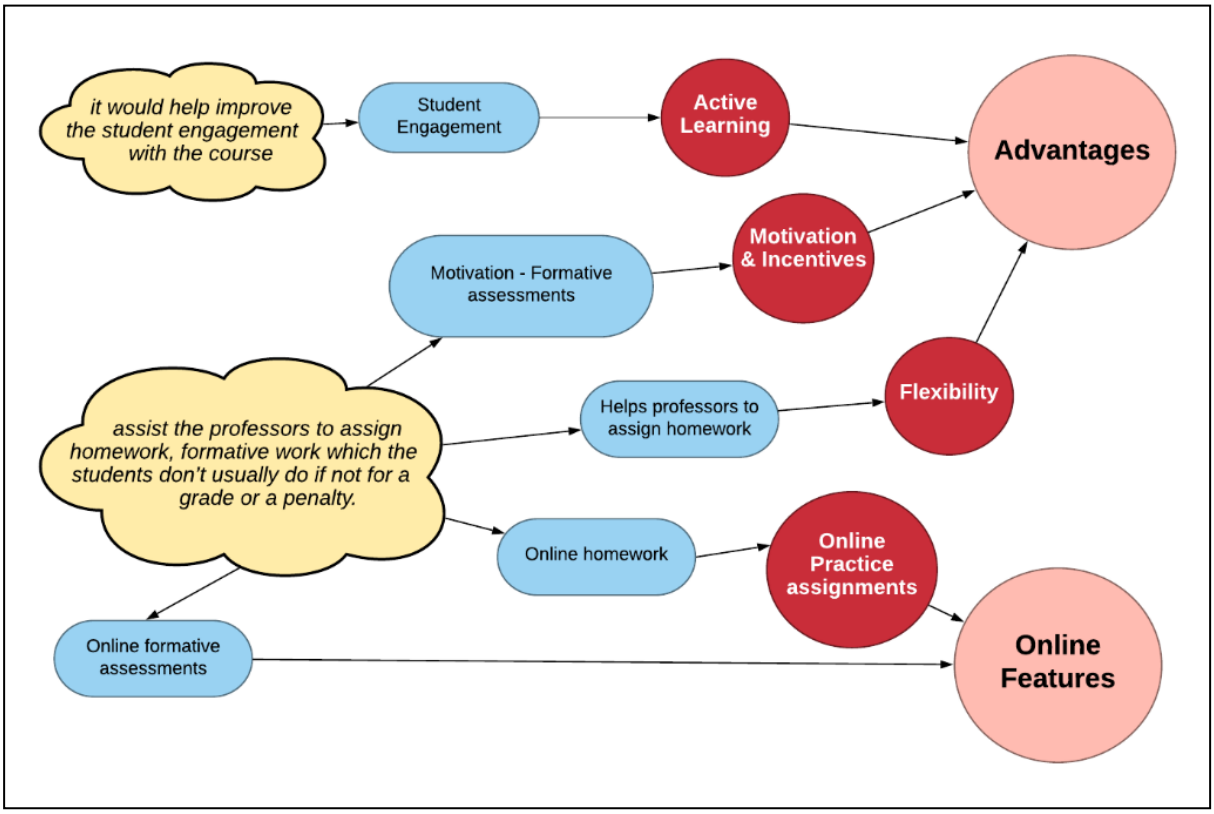


Figure 5.3: Grouping Codes into Themes (B)

5.2.2.4 Step 4: Reviewing of all Themes and Subthemes

During this phase, themes and subthemes were refined; some themes were broken down to smaller themes, while others collapsed into other themes. To achieve this, the first step was to review the coded data extracts in order to check if they coherently fitted into the respective theme; data were rearranged as needed, and a candidate 'thematic map' surfaced. The next step was to review the overall themes, by checking if the relationships between the themes reflected the meaning of the entire data set. This led into iterating steps two and three, as some themes appeared to overlap; eventually a valid thematic map was generated.

5.2.2.5 Step 5: Defining and naming all Themes and Subthemes

During this phase, a final checking of all themes was performed, to make sure that they all fitted into the overall context of the study; moreover, the finalised names of the themes were produced, replacing the original working titles. Sample snapshots of the finalised NVivo file displaying the final themes and a coded interview transcript can be seen in Appendix IV.

Figure 5.4 demonstrates steps 4 and 5 carried on from the previous example; more subthemes emerge to better accommodate the common elements between codes from all original data, while one of the previous codes (‘Online formative assessments’) was promoted to a subtheme. Moreover, the names of the codes and the themes were revised to better reflect their semantics.

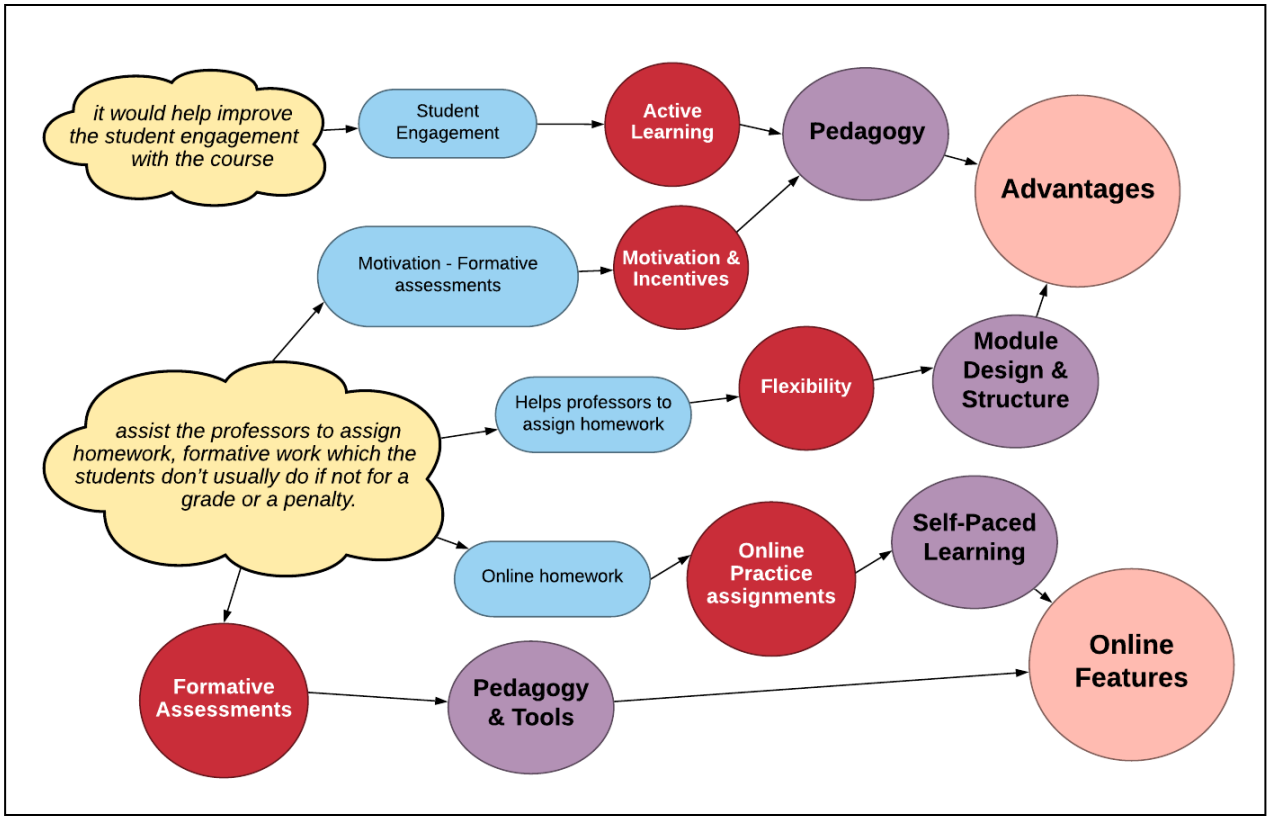


Figure 5.4: Reviewing all Themes and Subthemes

5.2.2.6 Step 6: Generating the Report

The complete presentation of all themes follows in the next chapter.

5.2.3 Ensuring Reliability

Cohen *et al*. (2018) point out that reliability in qualitative research has many facets, one of which is related to the findings' dependability. One way to ensure dependability is with respondent validation, by reporting the findings to the initial respondents so that they may confirm that these are indeed dependable.

Following this suggestion, the findings were communicated back to the module instructors. In addition to their continuous feedback, which supported the iterative revisions made during the data analysis step, as soon as the themes were finalised, they were presented to the instructors during a departmental meeting. The instructors were interested in both themes, as they could easily identify their own contribution, and the suggested process for the potential conversion of the module. The validation of findings was further confirmed as, due to the lockdown inflicted by the COVID-19 pandemic, the current module leader made practical use of the study's findings to successfully accommodate and coordinate the imposed transition to fully online learning.

Chapter 6 Data Findings

6.1 Theme 1: Face-to-face Features

All participants were prompted to discuss the features of the ‘Introduction to Information Systems’ module that they perceived as essential to be supported by the traditional, face-to-face learning environment. As already stated in Chapter 5 , the chosen data analysis was thematic analysis, so the objective was not simply to create a list of the features mentioned by the participants, but rather to interpret and analyse these features as these were perceived by the study participants in relation to the overall data set (Boyatzis, 1998; Braun & Clarke, 2006). Consequently, following the suggested steps of the thematic analysis methodology (Boyatzis, 1998; Braun & Clarke, 2006), the initial coding of the manually transcribed data was followed by an attempt to identify common - yet in several cases hidden - patterns between the codes; this process was iterated multiple times, and eventually themes started to emerge from the data. During this phase, it became apparent that a common attribute underneath multiple codes seemed to be the need for live, direct, real-time interaction between students and instructors, while the rest of the codes could be regarded as pedagogical techniques that could be employed within the context of the traditional, face-to-face learning environment. As a result, two main thematic entities surfaced, respectively titled ‘Sessions requiring direct interaction’ and ‘Techniques’. These, along with the emerged subthemes, are discussed below, in the order of their respective number of coding references; this sorting order (number of references) is maintained throughout the data

analysis section. Table 6-1 displays the number of references per theme, with the respective numbers for students and instructors separately.

Theme 1: Features F2F		Students	Instructors	Total
Theme 1.A Sessions requiring direct interaction	i: Challenging topics	6	16	22
	ii: Introduction to concepts	7	7	14
	iii: Hands-on concepts	5	6	11
	iv: Discussions	4	6	10
	v: Interesting topics	1	7	8
	vi: Student presentations	2	3	5
	vii: Office hours	2	0	2
	viii: Groupwork	0	2	2
Theme 1.B Techniques	i: e-learning	4	13	17
	ii: Gamification	1	2	3

Table 6-1: Features to remain F2F (Theme 1) - Students versus Instructors

6.1.1 Theme 1.A - Sessions requiring Direct Interaction (76)

The subthemes that were grouped within this thematic entity were ‘Challenging topics’, ‘Introduction to concepts’, ‘Hands-on concepts’, ‘Discussions’, ‘Interesting topics’, ‘Student presentations’, ‘Office hours’, and ‘Groupwork’.

6.1.1.1 Theme 1.A.i: Challenging Topics (22)

It became apparent that not only all three student focus groups, but also most instructors, reported that topics that are perceived as more challenging, and therefore possibly harder for students to comprehend, require the physical presence of instructors. It was evident from the students' comments that they felt more comfortable having an instructor interactively explaining the more complex topics - even though not many such topics were expected, given the freshman level of the module. It is also noteworthy to mention that many instructors and students pointed out that students with lower performance seemed to favour direct interaction when more sophisticated topics were covered; this finding revealed a possible association between the need for face-to-face interaction and students' performance: the lower the student's performance, the higher the need for face-to-face interaction. Admittedly, there is a potential subjectivity about what constitutes a challenging and/or complicated topic, as different students may perceive a different degree of challenge for different topics; nevertheless, most instructors stated that they were quite clear about topics considered hard to comprehend by most students, and some instructors even provided specific cases of such topics, such as the computer's system unit and the binary system representation.

Within one of the student focus groups, a student asked if real-time online sessions with the instructor might be a feasible option for the blended provision. However, the majority of their classmates emphatically stated that, for the more challenging concepts of the module, real-time virtual instructor

presence was not perceived as equally effective compared with the traditional face-to-face learning environment. Yet another student proposed a personalised-customised blended provision: for her, the ideal blended provision would allow each student to determine the proportion and features of the blend; this way, lower-performing students may choose a face-to-face session for the concepts that they perceive as harder to comprehend, while other students might prefer an online session for the same concepts.

Based on all participants' comments, it can be concluded that the level of complexity of a topic appears to be proportional to the need for face-to-face interaction: the less complicated the topic, the less need for face-to-face interaction.

6.1.1.2 Theme 1.A.ii: Introduction to Concepts (14)

All student focus groups and several instructors stated that they considered it critical to have the introductory lessons for all thematic entities of the taught material delivered via the traditional face-to-face mode. The instructors pointed out that the beginning of a new topic had to be clarified, and they felt that this could be ensured only with direct face-to-face interaction with students; gaining immediate feedback from students enables instructors to detect possible misunderstandings. Similarly, students stated that they needed instructors to acquaint them with the most significant elements of a topic, which they might miss if they were to study the same topic online.

6.1.1.3 Theme 1.A.iii: Hands-on Concepts (12)

This theme refers mainly to the practical, laboratory part of the module, which involves training and practice of office applications, ensuring that all students are familiar with fundamentals of spreadsheet, word processing and presentation software. It is noteworthy to state that, during the first iteration of data coding, opinions appeared to vary for this theme, as some students and instructors stated that most of the laboratory part should remain face-to-face, while others claimed the exact opposite. Nevertheless, further analysis of the data cast light on this. From the instructors' perspectives, it seemed that students have a frequently false perception of being already familiar with some of the practical skills taught at the laboratory sessions, such as basic software skills. Therefore, instructors appeared to believe that demonstrating the appropriate way of implementing the respective processes requires face-to-face interaction. The comments of some instructors implied that they felt they communicated the required concepts more effectively with face-to-face interaction. The instructors who seemed to favour the almost full conversion of the laboratory component to online mode were not essentially opposed to this view; as it became evident during the next iterations of data coding, they simply assumed that the introductory lessons - which, as already stated, should definitely need to occur in an actual computer laboratory with the students being physically present (see also section 6.1.1.2) - would cover this need. Students' views were aligned with this, as the students who stated that they would prefer most of this part to occur online also stated that they would still like the first and the last laboratory sessions to occur face-to-face. Once

more, participants acknowledged that the level of students' familiarity with the curriculum topics varied; nevertheless, instructors stated that there were specific laboratory-related concepts that it was essential to be demonstrated live to students - regardless of their level of experience with software packages - in order to ensure a consistent degree of computer literacy skills for these.

Moreover, a shared opinion between instructors and students seemed to be that simple hands-on laboratory tasks, such as formatting of fonts or paragraphs, or learning undemanding software applications such as Microsoft PowerPoint, could definitely move to the online component of the module. In fact, most participants clearly stated that such tasks should **not** be taught face-to-face. Allowing students to go over these online was perceived as more efficient; each student would be able to complete tasks at their own pace, without either having to wait for the instructor to explain something they already knew, or having to rush to a new topic when they felt they needed more time to practice.

6.1.1.4 Theme 1.A.iv: Discussions (11)

Students, instructors, and instructional designers all explicitly expressed their opinion about the role of in-class discussions, especially the ones involving clarifications and feedback on assessments, reviews, and question–and–answer sessions. One of the instructors explained that, although he was indifferent regarding the mode of taking an examination (online or face-to-face), he was adamant on meeting with his students face-to-face when going

over the examination's feedback; similarly, students stated that they appreciated these discussions, as they felt that it was easier for them to ask questions and directly receive clarifications and answers. Moreover, students reported that they highly valued the in-class peer-review process, especially for formative examinations.

6.1.1.5 Theme 1.A.v: Interesting Topics (8)

The need for the traditional classroom setting when covering topics of interest to students was acknowledged by participants from all three groups, i.e. students, instructors, and instructional designers. It seems that all participants felt that topics of direct interest to the students and/or with practical application to their everyday life, should be covered in-class, as students reported that they enjoyed the social aspects of discussing these with the instructor and with the other students. Similarly, instructors reported that they would like to cover in-class topics within the area of their own expertise, as this had been proven to enhance student engagement. It needs to be acknowledged that the potential subjectiveness for this theme may present a challenge for the actual conversion of the module to blended provision. Nevertheless, further analysis of the data demonstrated that there are some common topics of interest between students of this module, mainly related to online technologies, the Internet of Things (IoT), smart gadgets, social impact of Information Technology, cyberethics, and cybersecurity. Moreover, students also reported that topics requiring problem-solving and critical

thinking skills, such as basic computer programming, were also of interest to them, and they therefore favoured the face-to-face setting for these, too.

6.1.1.6 Theme 1.A.vi: Student Presentations (5)

A view shared by both students and instructors was that student presentations of their work should remain in the traditional face-to-face setting. The rationale behind this seems to be that allocating class time to allow students to present the outcome of research assignments motivates students to work with formative assignments. This latter point appeared to be quite important, as both students and instructors repeatedly pointed out that it is quite common for students not to complete formative assignments unless there is some type of reward or penalty; this motivation issue is also addressed later in sections 6.2.1.1, 6.2.1.2.1, 6.2.1.4, 6.3.1.3, and 6.4.2.3.

6.1.1.7 Theme 1.A.vii: Office Hours (2)

Students expressed their concerns regarding instructors' office hours. Confirming that office hours could still be held at the instructors' physical offices seemed to reassure them. It seems that real-time online office hours via videoconferencing were not regarded by students as an effective substitute of actual office hours; rather, they perceived the online option as an appealing option to complement the face-to-face office hours. Even students who admitted that they rarely made use of instructors' office hours remarked that knowing that the instructors are physically available just in case their support was needed was comforting; as one student said, "it feels better when

you go to your professor for a question or clarification... it's more personal and encouraging". Moreover, the risk of technical issues was also reported as an argument against completely replacing regular office hours with online ones.

6.1.1.8 Theme 1.A.viii: Groupwork (2)

It was reported by some instructors that they had a positive experience with in-class collaborative assignments, which involved students working in-class in small groups of two to four persons, under the supervision of the instructor who acted as a facilitator. Instructors perceived these in-class group projects as quite effective in relation to students' learning. These instructors stated that they had the opportunity to use formative in-class quizzes to test the students' performance after such collaborative in-class projects, and the majority of students had a high performance in the quizzes.

6.1.2 Theme 1.B - Techniques (20)

As previously mentioned, this theme includes pedagogical techniques that the participants suggested should continue to be utilised within the traditional, face-to-face context. The subthemes that surfaced here, ordered once more by the number of coding references, were e-learning and gamification.

6.1.2.1 Theme 1.B.i: e-learning (17)

Instructors advocated in favour of technology tools that could support the traditional classroom setting, such as the Blackboard CMS, which is the CMS currently used by the College, clickers, game-based learning platforms such

as ‘Kahoot!’, and simulation platforms such as SimNet by McGraw-Hill. One of the instructors also mentioned that the ideal classroom for this module would be the computer laboratory, so that students would have the opportunity to work with computers not only for the practical ‘lab’ part of the module, but for the entire face-to-face teaching; nevertheless, the same instructor acknowledged that this was not feasible with the current laboratory infrastructure of the College.

6.1.2.2 Theme 1.B.ii: Gamification (3)

Students, instructors, and instructional designers praised the use of gamification complementing face-to-face teaching. Students reported that their experience with in-class games was not only entertaining but also very effective learning-wise. They even praised specific games that were used in-class, such as games of computer programming, matching terms, classification, question and answer (Q&A) trivia-type games, role-playing, etc.

All themes are displayed in Figure 6.1. The areas in the diagram are sized proportionally to the number of coding references to each theme, while the themes’ hierarchy is represented by colour. The darkest colour denotes the highest theme levels - ‘Sessions Requiring Direct Interactions’ and ‘Techniques’, while the lighter colour is used to visually represent the sub-themes in each general theme - for instance, ‘Challenging Topics’, ‘Hands-on Concepts’, etc. The same coding scheme is used for the other diagrams representing themes in this chapter: the darker the colour, the higher the level of the theme.

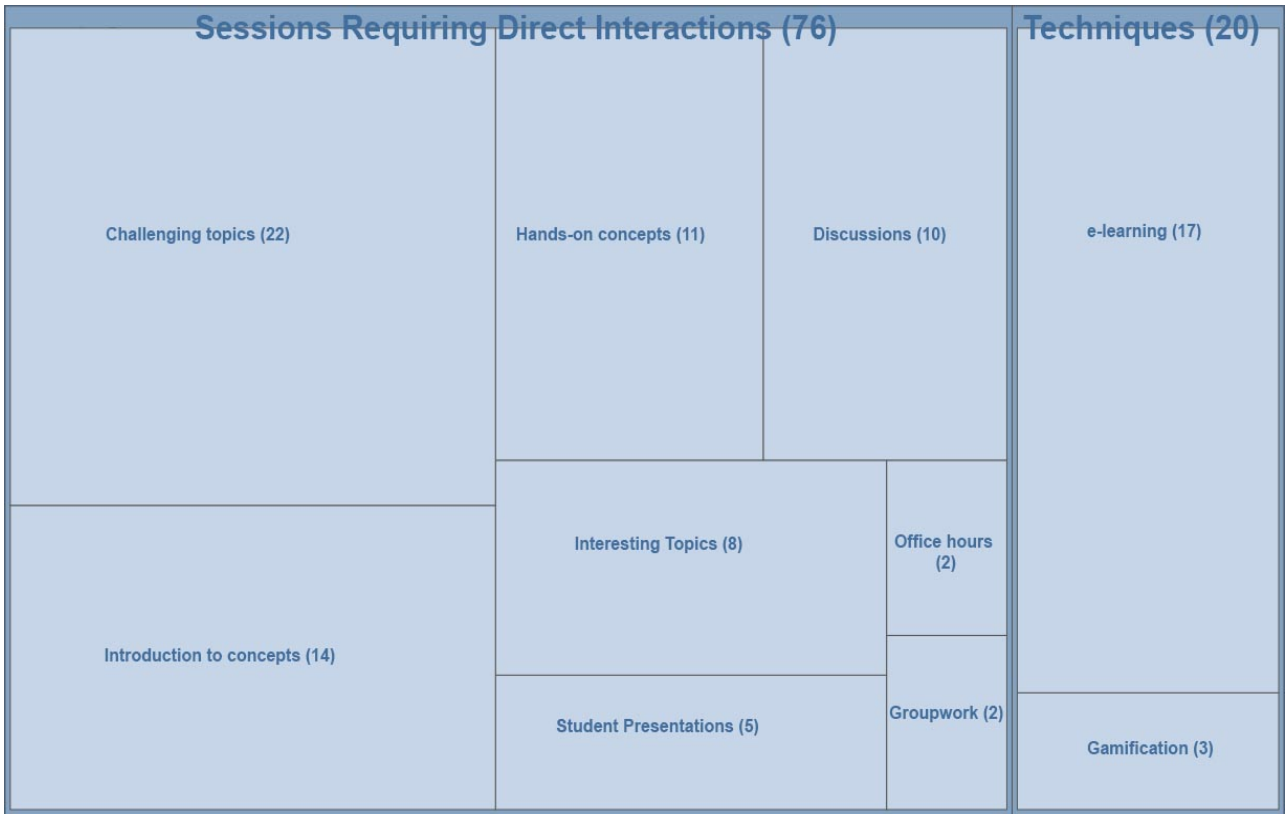


Figure 6.1: Theme 1 - Features face-to-face

6.2 Theme 2: Online Features

All participants were asked to contemplate any features of the module that they regarded as applicable for the online component of the blended learning provision. The focus was set primarily on features that were perceived as being reinforced by the online mode, resulting in a more effective and efficient teaching and learning experience in comparison with the traditional, face-to-face classroom setting. Two main themes emerged, ‘Pedagogy and tools’ and ‘Self-paced learning’. Table 6-2 displays the total number of references per theme, with the sub-totals of students and instructors, while Figure 6.2 displays all the subthemes.

Theme 2 - Online Features		Students	Instructors	Total
Theme 2.A Pedagogy and Tools	i: Formative Assessments	13	31	44
	ii: Study Aids	13	25	38
	a) Videos and Tutorials	10	14	24
	b) Empirical – Exploratory Aids	0	7	7
	c) Readings	3	4	7
	iii: Gamification	2	5	7
	iv: Simulation Platform	3	3	6
	v: Course Management System	4	2	6
	vi: Make-up Classes	2	3	5
	vii: Real-time Meetings	3	2	5
	viii: Student Support	1	4	5
Theme 2.B Self-Paced Learning	i: Practice Assignments	22	15	37
	ii: Basic, Simple Concepts	8	25	33
	iii: Flipped-class Activities	2	5	7
	iv: Group Activities	2	4	6

Table 6-2: Online Features (Theme 2) - Students versus Instructors

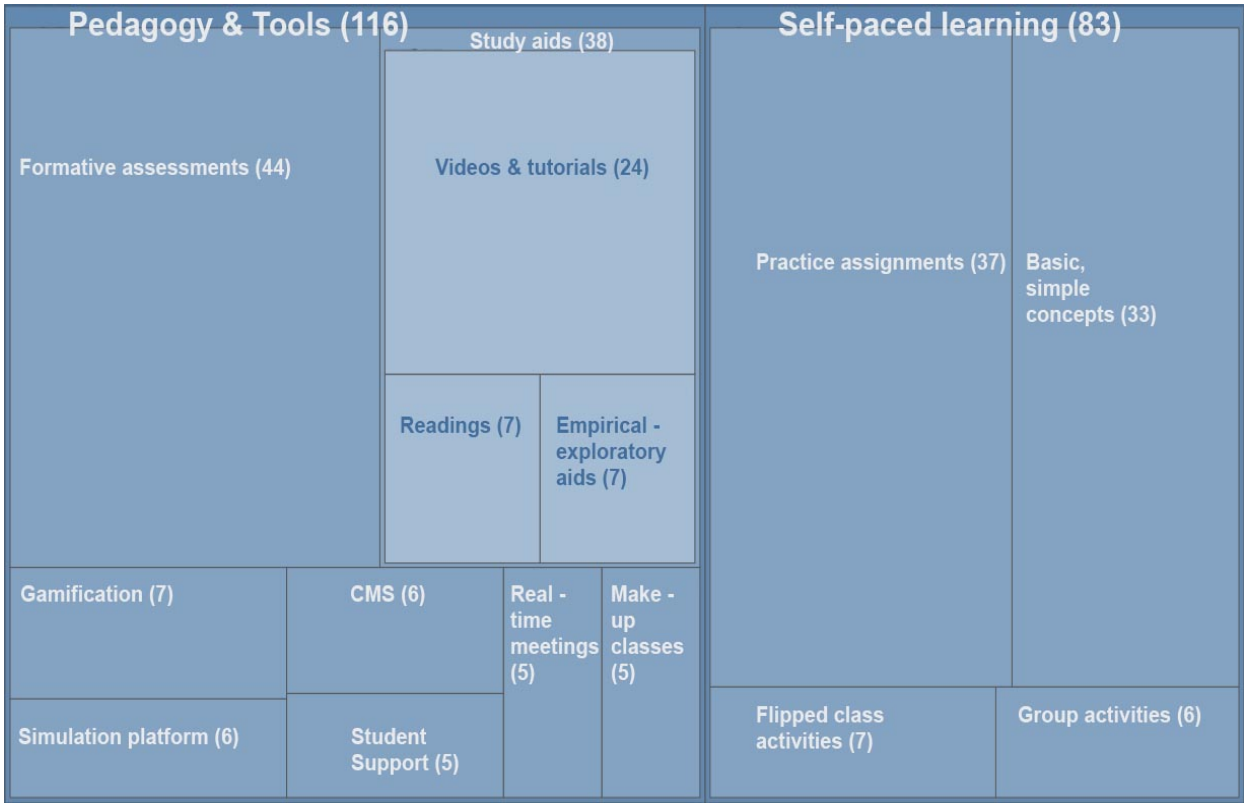


Figure 6.2: Theme 2 - Online Features

6.2.1 Theme 2.A - Pedagogy and Tools (116)

It was evident from the data that many of the ideas and suggestions made by the participants were essentially pedagogical techniques and tools that may enhance the overall learning experience, perceived as being promoted by the online component of blended learning provision. All participants widely contributed to this theme, as they all shared at least one tool and/or technique that, according to their perception, would improve the overall teaching and learning experience of the module. The participants' input was grouped in multiple subthemes.

6.2.1.1 Theme 2.A.i: Formative Assessments (44)

An impressive number of the suggested features appeared to be related to one or another type of formative assessment. Students thought of the various assignments they had to complete for the module, and they came up with several that, according to their own experiences, were better conducted online; most of these were also endorsed by instructors, too. A substantial list was composed, enriched with some additional types of online formative assessments that were proposed by instructors who had attended the online faculty training (OFT) seminar of the College. The list included online tests, group activities, contributing to wikis, self and peer evaluations, weekly assignments, creating blogs, use of the VoiceThread Blackboard tool to add interactive comments to videos and presentations, research assignments, contributing to forums, concept-matching assignments, and use of social media.

An interesting finding related to this theme was that the vast majority of the participants seemed to believe that a blended provision for this module might alleviate a currently prevailing issue, related to a lack of incentive for the students to complete formative assessments (see also section 6.1.1.6 discussed earlier, and also later sections 6.2.1.2.1, 6.2.1.4, 6.3.1.3, and 6.4.2.3). It was reported that students tend to complete assignments only if there is either a direct contribution of this assignment to the overall grade, or a consequence for non-completion/submission; hence, in the current face-to-face mode of the module, formative assessments are quite frequently

overlooked by students. As previously discussed in section 1.2.1, according to the College's guidelines for blended modules, attendance during online weeks is defined as active and timely engagement with online weekly activities, so failure to complete an online assignment may result in an absence. Consequently, most participants reported that the potential absence might motivate students towards completing formative assignments – nevertheless, not all instructors shared this view; one instructor seemed concerned as he reported that students might still reach the limit of allowed absences. Yet another finding was that completing such assignments online seemed to students more entertaining compared to the traditional face-to-face setting.

6.2.1.2 Theme 2.A.ii: Study Aids (38)

Among the elements indicated by participants, many appeared to share the capability of facilitating students in their studies. Consequently, the 'Study Aids' subtheme emerged, including uses of videos and tutorials, empirical–exploratory aids, and readings.

6.2.1.2.1 Theme 2.A.ii.a: Videos and Tutorials (24)

This feature was enthusiastically endorsed by all participants. Some participants recommended using video tutorials that were already available on Internet platforms, while others referred to the potential of using videos prepared by the module's instructors specifically for this module. The instructional designers also mentioned that the College's recent acquisition of special software for this purpose (Panopto) looked quite promising as it would

facilitate the instructors for the preparation of such videos. An interesting point was made by one of the instructors, who explained that a few years ago he created a series of video tutorials for the laboratory part of the module; nevertheless, the usage statistics data he collected revealed that the majority of views for his videos were from the US, and only a very small percentage of his own students actually used them. His interpretation of this was that his students were not motivated to use these videos, as these were optional, and not directly linked to a summative assessment. He expressed his concern about the potential use of video tutorials for the blended provision, too. Although, while according to the blended learning provision policy of the College students would be marked as absent in case they did not complete the designated online activities, the instructor was not convinced that the video tutorials would be appropriately used, as he was afraid that students might simply click/fast forward the videos just to avoid being marked as absent. This concern related to formative assessments was also addressed earlier in sections 6.1.1.6 and 6.2.1.1, and also in later sections 6.2.1.4, 6.3.1.3, and 6.4.2.3. Nevertheless, as suggested by other participants - both instructors and students - students would benefit from such tutorials, provided that these would be treated as study material required for summative assessments.

Another noteworthy suggestion involving videos was the possibility of recording lectures and then making them available via the College's CMS. Students seemed to favour that option, as they stated that this would allow them to pause, rewind and replay a critical part of the lecture as many times

as they needed. Similarly, instructors suggested that recording lectures - live or not - looked quite appealing; they stated that this would definitely be a feasible option for at least the most critical class sessions, but not all of them, as this would not only result in additional workload for the instructors, but it might also demotivate the students from attending the face-to-face sessions.

6.2.1.2.2 Theme 2.A.ii.b: Empirical – Exploratory Aids (7)

This theme included tools that bring the most out of topics directly related to online technologies, such as e-commerce, the WWW, the Internet, cyber-security, etc. Instructors stated that the nature of these topics dictates an online hands-on delivery, without the need of an instructor's presence.

6.2.1.2.3 Theme 2.A.ii.c: Readings (7)

This subtheme surfaced as a common attribute between e-book assignments, online readings, and mash-ups. E-books were indicated by many participants, and students seemed to favour these over traditional books – although it should be noted that one student explicitly stated that she preferred paper over screen for studying, and one instructor also seemed cautious about the use of e-books (see later section 6.3.2.3). Moreover, instructors with blended learning experience referred to additional readings that could be assigned to students, either with specific web addresses of sites with appropriate content, or with links to the College's library available via the module's Blackboard container, or even via mash-ups that combine information from various sources. Such readings could be updated every academic term, so students

could always be up-to-date about the latest trends related to the module's content.

6.2.1.3 Theme 2.A.iii: Gamification (7)

Gamification emerged as a subtheme not only under the online elements of the blended provision, but also in the face-to-face elements already addressed earlier in section 6.1.2.2. Students had the opportunity to work with various formative assignments that involved game-playing elements throughout the module. Participants reported that the online mode certainly favoured the use of games, so the use of online games was highly recommended, as the overall experience of the learning process became more entertaining and rewarding. More than one student expressed their enthusiasm about the online game-like computer programming assignments they had had the chance to carry out; one student stated "these were so much fun, and when I managed to complete them it felt so good... I thought programming was tough, but I did it!"

6.2.1.4 Theme 2.A.iv: Simulation Platform (6)

At the beginning of the academic semester in spring 2015, and upon my own recommendation as I was also the module leader of the module then, the SIMnet training and assessment platform was introduced in the module. SIMnet is designed to provide students with a simulation platform for most MS Office packages and for file management and operating system concepts. In the module of this case study, SIMnet was introduced along with an electronic

textbook, which extended the platform's use as the e-book came with additional interactive lessons, test banks, and various other tools that instructors could employ to design customised assignments (McGraw-Hill, 2019). Instructors can easily keep track of their class assignments, and they can even create personalised assignments for students who may need additional practice. In reports, instructors admitted that although SIMnet had indeed a lot of potential and it looked promising, not all of them used it, and the ones who did were not satisfied with the outcomes. Once more, the issue of students not completing formative assessments came up (see sections 6.1.1.6, 6.2.1.1, 6.2.1.2.1, 6.3.1.3, and 6.4.2.3); as one instructor humouredly stated about SIMnet: "I use it, but my students don't!" One student declared that, "SIMnet is not so nice, it can really be boring", while others contradicted him by saying that SIMnet lessons were very helpful. Overall, most participants stated that an interactive simulation platform such as SIMnet or something similar would definitely support the online component of the blend.

6.2.1.5 Theme 2.A.v: Course Management System (6)

The CMS currently in use at the College, introduced over fifteen years ago, is Blackboard CMS. During the interviews and the focus groups, it was made clear to all participants that the online component of the blend would certainly involve the use of a CMS. Therefore, it came as no surprise that the use of Blackboard was taken for granted by all participants; some explicitly referred to specific tools that would have to be used for the blended provision, such as task management, groups, electronic submission, VoiceThread, etc.

6.2.1.6 Theme 2.A.vi: Make-up Classes (5)

The College is encouraging instructors to substitute any classes they may miss with online ones, and for the majority of students this substitution has served as a first 'pilot' experience with the online mode of a blended provision. The College's policy about such online classes is similar to the one for blended learning modules, i.e. it states that since the online assignments are the equivalent of the students' virtual presence to the missed class, failure of a student to complete the designated tasks will result in an absence for that class. Most instructors stated that they had effectively used this option by substituting a missed class with a set of online assignments, including readings, quizzes, research work, etc. Nonetheless, some instructors pointed out that although they clearly communicated the policy to their students, some students did not complete the assignments, therefore being marked as absent. However, students did not seem troubled about this policy; on the contrary, they seemed to be quite comfortable with this.

6.2.1.7 Theme 2.A.vii: Real-time Meetings (5)

It became evident from the data that some students and instructors found the possibility of real-time online sessions quite interesting and appealing. The possibility of adding one or two real-time online sessions in the online element of the blend was indicated by some instructors and students. It is interesting to point out that the participants who expressed an interest in this alternative were also the ones that seemed the most cautious when asked their overall opinion regarding the potential conversion of the module to blended provision.

It seems that such real-time online sessions were perceived by these participants as a close surrogate to the familiar face-to-face classroom setting, and this option appeared comforting and reassuring to them.

6.2.1.8 Theme 2.A.viii: Student Support (5)

Yet another reassuring feeling came from suggestions regarding the option of instructors providing online support to students. In addition to the current practice of e-mail communication between students and instructors, and similar to other practice stated earlier (see section 6.2.1.7), some of the students who appeared reluctant in accepting the possibility of replacing part of the familiar face-to-face classroom setting with online activities reported that having online real-time office hours - in addition to the face-to-face ones - would be helpful. This view was also shared by some instructors, too. It is noteworthy that some participants stated that real-time online support sessions might prove to be even more helpful than face-to-face meetings for students lacking confidence and of a more reserved nature.

6.2.2 Theme 2.B - Self-paced Learning (83)

While reviewing the collected data in an attempt to identify common attributes between features, a question that arose was ‘Why is it that participants prefer this specific feature online instead of having the instructor going over this in-class?’ The theme discussed here emerged as a common characteristic between features that participants seemed to perceive as not requiring direct interaction. The key attribute that surfaced after careful review of the collected

data, and which acted as the common link that grouped these elements together, was that participants seemed to prefer the online delivery of these elements primarily because this would enable students to complete the activities at their own pace. The data revealed that the online mode was translated by participants as, among other attributes, flexibility to complete tasks anytime they wished - within given deadlines - from any location they wished, and at their own pace. It became evident that some students lost their interest in class when they had already grasped a concept but they had to wait for the instructor to clarify and explain this to the rest of the class; yet other students felt rushed when they could not follow up the pace of the rest of the class, as they needed more time. Subsequently, the self-paced learning quality of the online mode emerged as a common attribute between the following subthemes: ‘Practice Assignments’, ‘Basic, Simple Concepts’, ‘Most Features’, ‘Flipped-class Activities’, and ‘Group Activities’.

6.2.2.1 Theme 2.B.i: Practice Assignments (37)

Participants indicated that the face-to-face classroom mode was not necessary for most practice assignments. In fact, they seemed to prefer to practice without the supervision of an instructor. The suggested elements here were both summative and formative assessments; explicit references were made to hands-on laboratory-related assignments, and to research assignments. It has to be noted that this theme essentially referred to homework assignments, so it was expected to include these in the ‘out-of-class’ element of the blend.

6.2.2.2 Theme 2.B.ii: Basic, Simple Concepts (33)

Several of the participants' suggestions about features of the module that would be better delivered online were about specific subjects included in the module's curriculum, such as basic definitions of concepts, factual information, types of computer hardware and software, etc. A more thorough review of these revealed that a common attribute between these features was that they were all perceived as easy to comprehend; hence, participants reported that students seemed to prefer studying these by themselves, mainly because this would be faster for them.

An interesting discovery is that some participants appeared so enthusiastic with the idea of blended provision they seemed in favour of seeing most of the features converted online - with the exception of the introductory sessions (see section Theme 1.A.ii: Introduction to Concepts (14); they even seemed disappointed when they realised that the online component could take only up to fifty percent of the class meetings. However, further discussion with these participants revealed that the reason they were so eager to endorse the online mode was that they considered the majority of the module's subjects as very easy to comprehend and - in several cases - they were already familiar with these subjects. This finding is quite important, as it reveals the different levels of student performance across this module, which is something that will certainly have to be addressed - regardless of the potential transition to blended provision.

6.2.2.3 Theme 2.B.iii: Flipped-class Activities (7)

Several participants who had already experienced flipped-class activities indicated that the very nature of these activities made them ideal for the blended provision of the module. Students would be assigned to do something online, and discussion of the findings would take place in-class with the instructor present.

6.2.2.4 Theme 2.B.iv: Group Activities (6)

As already stated earlier, collaborative activities were indicated as one of the elements prospering with direct interaction, therefore remaining within the traditional face-to-face classroom setting was deemed critical (see section Theme 1.A.viii: Groupwork (2)). Nevertheless, more thorough analysis of the data revealed that in several instances the same participants who stated that they enjoyed working in groups in-class guided by their instructor, also reported that the online mode of the blended provision would also be supportive for groupwork. It became evident that participants wished to have collaborative activities both in-class and online.

6.3 Theme 3: Perceived Challenges

It was evident from the collected data that the potential transition of the module to blended format was perceived as an interesting, yet challenging process. All participants contributed to this theme, as they all reported more than one potential issue that the new modality might give rise to. The two main themes that were identified after the thematic data analysis were

'Teaching and Learning' and 'Implementation'. Table 6-3 shows the number of references for each theme for students and instructors separately, while Figure 6.3 displays the challenges perceived by the participants, in the form of the themes uncovered by the data analysis.

For purposes of consistency, all themes and subthemes are presented here in the same order adopted in the previous sections, i.e. their respective number of coding references, which is listed inside the parenthesis that follows the theme's title.

Theme 3: Perceived Challenges		Students	Instructors	Total
Theme 3.A Teaching and Learning	i: Lack of Experience	20	27	47
	ii: Additional Responsibilities	0	38	38
	iii: Quality Concerns	12	14	26
Theme 3.B Implementation	i: First Time Challenge	0	15	15
	ii: Standardisation	0	11	11
	iii: Technology Limitations	0	5	5

Table 6-3: Perceived Challenges (Theme 3) - Students versus Instructors

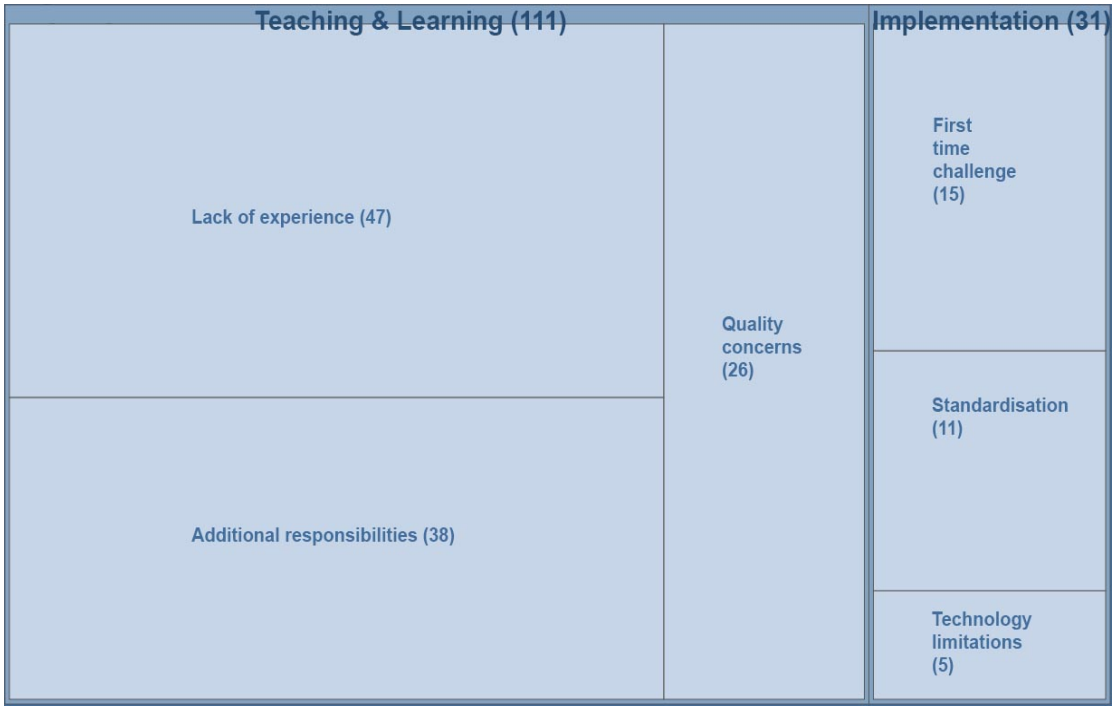


Figure 6.3: Theme 3 - Perceived Challenges

6.3.1 Theme 3.A - Teaching and Learning (111)

Most of the concerns that were expressed by the participants were related to the overall teaching and learning process. The subthemes that surfaced within this thematic set were: ‘Lack of Experience’, ‘Additional Responsibilities’, and ‘Quality Concerns’.

6.3.1.1 Theme 3.A.i: Lack of Experience (47)

Their lack of prior experience with blended or even fully online educational settings seemed to be perceived as an alarming factor by most of the participants. Both instructors and students appeared rather cautious of the fact that students are used to the traditional, face-to-face classroom environment, in which the instructor’s physical presence acts as a prompt for

students to engage in the overall educational experience. The reduction of this presence implies that students will have to manage their time appropriately in order to complete the required online activities, which in turn presupposes that students have the maturity and the self-discipline needed to do so. Several instructors, including the professor who is currently teaching another module with the blended format, and also the - already experienced with blended learning - instructional designers, pointed out that students will definitely need time to adapt to the different modality, as they will need to become acquainted with the 'new' ways - for instance, they will have to realise that failure to complete the online activities will result in an absence of the equivalent virtual class. Students seemed to share this view, explicitly stating that the instructor's presence is vital for prompting them to engage. Moreover, a few instructors seemed to believe that the young age of the majority of students taking this freshman introductory module is not compatible with the level of maturity that they perceived as a critical requirement for blended learning - stated in respect to necessary self-control and self-discipline. Finally, some participants commented on the level of technology experience that blended learning requires; according to them, the new modality requires a certain degree of familiarisation with technology, and it might be possible that some students might not have it.

6.3.1.2 Theme 3.A.ii: Additional Responsibilities (38)

It was evident from numerous instructors' comments that the potential transition of the module to a blended format caused great trepidation in

respect to possible additional workload for the instructors. Although this theme emerged primarily from instructors voicing concerns regarding additional work and responsibilities conceivably required by the new modality, some students' remarks also revealed the same concern; it became clear that students seemed to acknowledge that their instructors would have to invest more time and effort if a transition to a blended modality were to take place, and this made them feel uneasy as they were not certain that the instructors would be willing to do so.

One of the points that was raised by most participants involved the workload related to the preparation tasks the instructors would have to carry out towards the implementation of the change - especially at the beginning, and taking into consideration the collaboration with the instructional designer. Moreover, instructors pointed out that the time saved from the class sessions that would no longer be held in a physical classroom did not seem enough to make up for the time needed for all the extra tasks they would have to undertake, such as designing the blended activities, assessing these, and also providing students with the appropriate feedback for these activities. Similarly, instructors stated that ensuring appropriate online student participation would also require additional time on their behalf, as they might have to schedule additional face-to-face meetings with students to ensure their involvement and they would also have to vigilantly monitor the students' participation and performance - even more so at the beginning.

In addition, the understandable requirement for an increased daily interaction with computers in order to accommodate the online component of the blended modality was not welcomed by some of the participants; it seemed that the prospect of more screen-time was perceived as a drawback.

Another time-related voiced concern was related to the eight-week training that the College imposes as a requirement for instructors to complete before they can teach a blended module. This concern was not pointed out only by instructors who had not yet attended the training; participants who had successfully completed this acknowledged the considerable time and effort required by this training.

It was evident from the participants' comments that, although most participants seemed positive towards blended learning, they were not certain that the transition to this new modality would outweigh the potential drawbacks; quoting one of the instructors, "blended learning seems great, but I am not sure it's worth the trouble".

6.3.1.3 Theme 3.A.iii: Quality Concerns (26)

This theme encompasses issues that students and instructors considered as possibly negatively affecting the quality of the pedagogical setting. Most comments related to this theme revolved around the perceived loss of 'personal touch' that is present in the traditional face-to-face environment. As already discussed in section 6.1.1, it became clear that participants highly valued the direct interaction of the face-to-face setting, which was perceived

as a significant catalyst for the overall educational experience. Both students and instructors expressed their concern about the potential reduction of face-to-face meetings, as they strongly believed that online classes cannot simulate the feeling of direct personal communication. Adding on to this, one instructor pointed out that students who experience poorly designed blended learning may end up preferring the face-to-face mode, as “the personal touch of the professor is the one that makes the difference”.

Another issue perceived as potentially affecting the quality of the learners’ experience is related to students’ motivation regarding formative assessments. Most participants appeared to believe that the consequence of being marked as absent would provide an effective incentive for students to complete formative assignments - this is also discussed in sections 6.1.1.6, 6.2.1.1, 6.2.1.2.1, and 6.4.2.3. Nevertheless, one instructor pointed out that this incentive might not be powerful enough, as students might avoid assignments critical for their learning, by simply saving their absences for such cases. The same instructor added that if the main incentive for completing assignments was the equivalent of a virtual class presence, this could have a negative impact on the quality of both their engagement and their performance, since the submission - and not the quality or the grade - of students’ work would be the one confirming the students’ presence.

6.3.2 Theme 3.B. - Implementation (31)

Numerous comments from instructors addressed issues related to practical matters that might arise during the process of implementing the conversion of

the module's format to a blended setting. The emerged subthemes here were: 'First Time Challenge', 'Standardisation', and 'Technology Limitations'.

6.3.2.1 Theme 3.B.i: First Time Challenge (15)

Some participants appeared concerned with blended learning being a new and therefore unfamiliar modality, as most students and instructors are not yet experienced with it. This lack of experience, which is also reviewed earlier from a pedagogy perspective (see section 6.3.1.1), surfaced as a concern also within the context of the process of converting the module from its current traditional face-to-face format to a blended mode; as stated by one instructor, it seemed easier to design a new module as blended than converting an existing one. Moreover, participants seemed to worry that potential unforeseen challenges might rise during the first time the module would be run with the new format.

6.3.2.2 Theme 3.B.ii: Standardisation (11)

Many instructors commented on the requirement for standardisation for this particular module, due to its multi-section nature. As already explained in section 1.2.2, the module of this case study runs in multiple sections during the same academic period, so various instructors get to teach the different sections; nevertheless, all instructors have to follow the same module outline, cover the same material, and use the same summative - and even some formative - assessments, so consistency across all sections is critical. In the current traditional face-to-face setting, one of the responsibilities of the

instructor who serves as the module leader is to arrange norming sessions in order to ensure the required standardisation. Although most participants seemed to believe that a blended format might eventually reinforce standardisation, and therefore facilitate the job of the module leader (see section 6.4.1.1), some instructors explicitly expressed their concern about the challenge of effectively and efficiently coordinating the online component of the module. One focal argument was that, to their perception, the amount of feedback to be communicated to students increases for blended modality, as assignments would replace face-to-face classes. In any case, instructors would have to provide feedback to all these assignments, and this feedback must be consistent across sections; however, as one instructor stated, “I may write two paragraphs of detailed feedback while another [instructor] may simply write ‘good work’”. Nevertheless, these instructors were not negative about making the transition to blended format; they simply pointed out that standardising everything would be more challenging, as more norming meetings and extensive instructor training would be required.

6.3.2.3 Theme 3.B.iii: Technology Limitations (5)

A shared concern between some instructors seemed to be about the technology requirement of blended learning. Some participants reported that a blended modality seemed too dependent on technology - not as much as a fully online mode but certainly more than the face-to-face one - and this dependence presupposes a very strong and efficient infrastructure, which in turn might require additional funding. One instructor pointed out that the

College's CMS, Blackboard, might not be capable of efficiently supporting the online activities of the blended modality - at least with the tools currently in place; she suggested that, to her knowledge, there were additional tools that could be utilised by Blackboard but the College would have to invest in their acquisition and installation. Another instructor acknowledged that the College had already purchased some tools that might be of value for implementing the online activities of the blended modality, such as Panopto video capturing software; however, it was evident that he was not keen in investing additional time and effort in using these. One more technology-related voiced concern related to the use of an electronic textbook; although the module has adopted an e-book as the official textbook for more than four years now, some comments were made regarding the inefficiency of electronic books. According to one instructor, some students seemed to prefer traditional paper format textbooks instead of electronic ones, with the latter being a perceived requirement of a blended learning setting.

Figure 6.4 portrays perceived challenges in a Venn diagram; the overlapping area represents the challenges that may be perceived from both the teaching/learning and implementation perspectives.

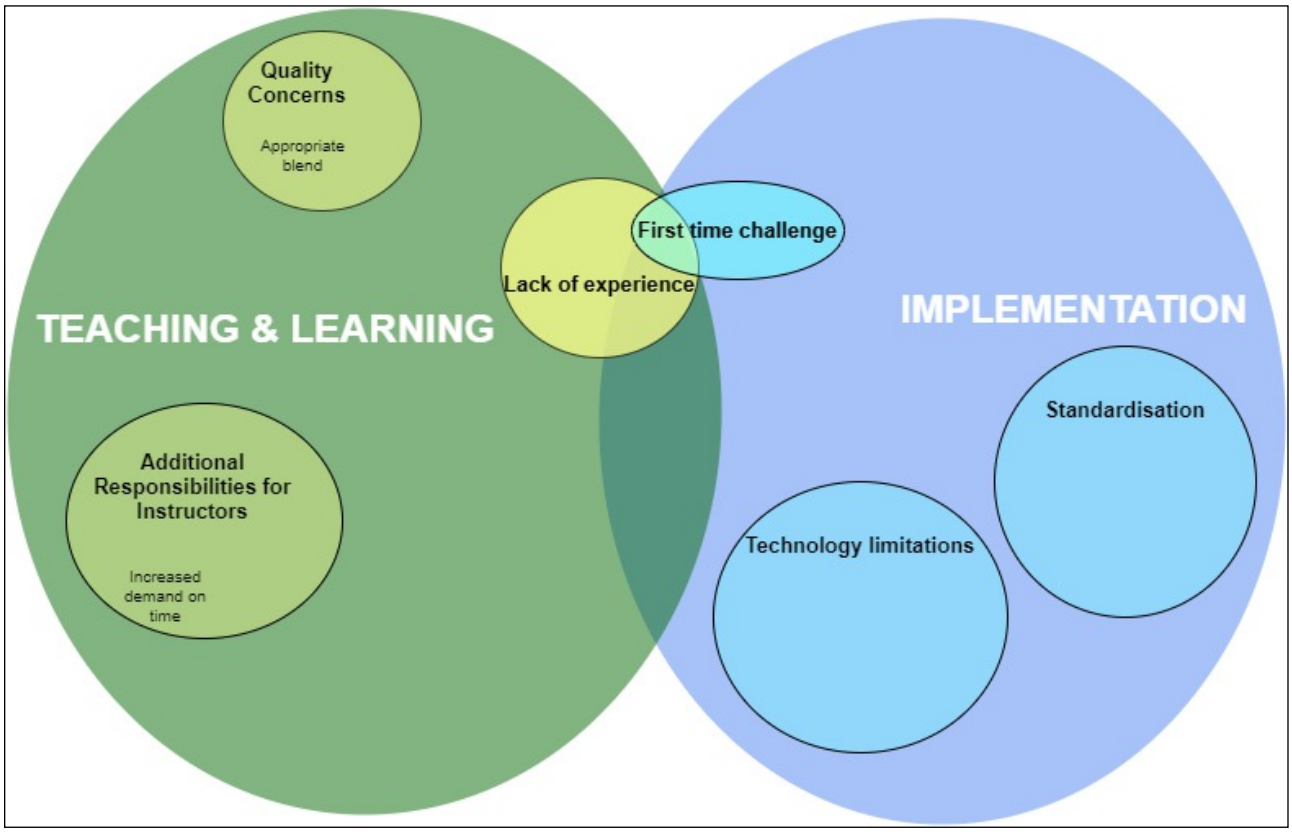


Figure 6.4: Perceived Challenges

6.4 Theme 4: Perceived Benefits

During the interviews and the focus groups, participants were quite keen to talk about various aspects of the blended provision that they perceived as value-adding to the overall teaching and learning process. Once more, the standard steps of thematic analysis were followed, so after multiple iterations of data coding and analysis, two main themes emerged; the one with the higher number of coding references involved advantages related to the practical aspects of designing and preparing the module, so it is labelled 'Module Design and Structure'. The other one, 'Pedagogy', includes benefits associated with the actual teaching and learning process. Figure 6.5 visually

demonstrates the identified themes, while Table 6-4 shows the number of references per theme for students and instructors separately.

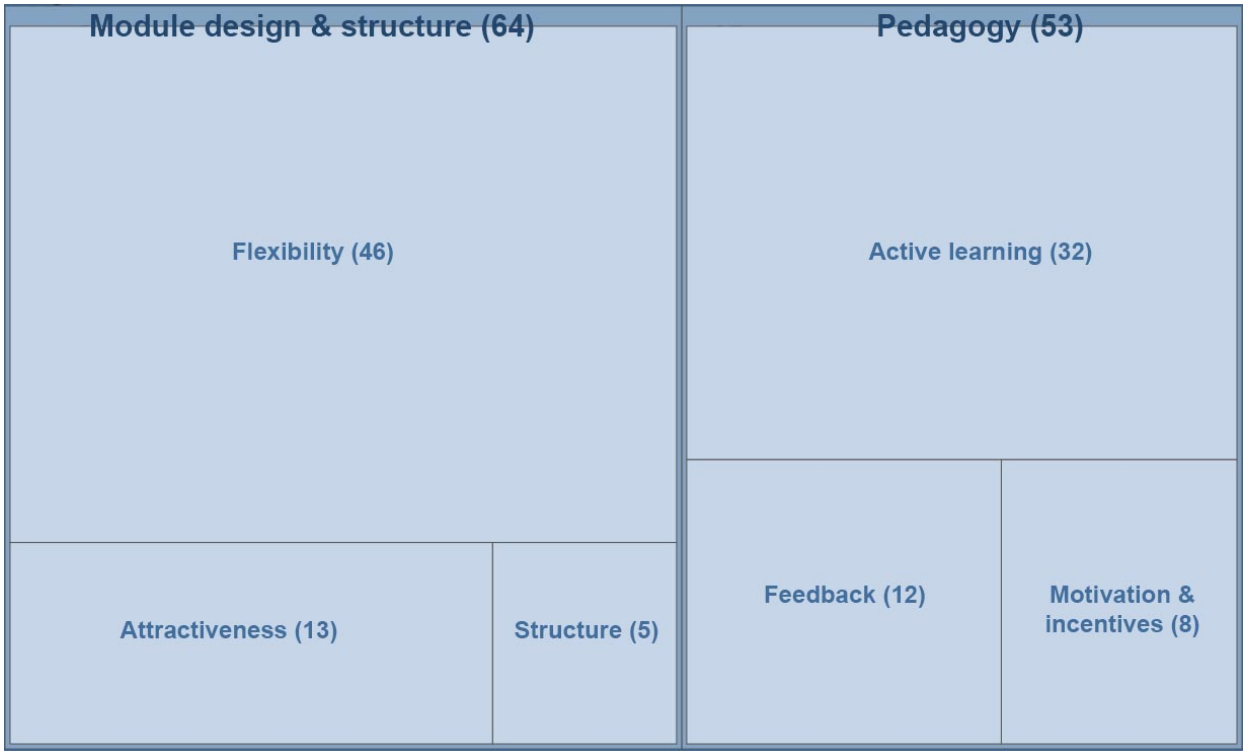


Figure 6.5: Theme 4 - Perceived Benefits

Theme 4: Perceived Benefits		Students	Instructors	Total
Theme 4.A Module Design and Structure	i: Flexibility	16	30	46
	ii: Attractiveness	1	12	13
	iii: Structure	0	5	5
Theme 4.B Pedagogy	i: Active Learning	7	25	32
	ii: Feedback	0	12	12
	iii: Motivation and Incentives	2	6	8

Table 6-4: Perceived Benefits (Theme 4) - Students versus Instructors

6.4.1 Theme 4.A - Module Design and Structure (64)

This main theme surfaced as the most numerous; the perceived benefits appeared to involve practical aspects related to the module's structure and overall design. In-depth analysis of the data revealed common attributes among these benefits, eventually leading to the emergence of three subthemes, i.e. 'Flexibility', 'Attractiveness', and 'Structure'.

6.4.1.1 Theme 4.A.i: Flexibility (46)

All participants seemed to identify various benefits that might be linked to a flexibility, potentially enabled by blended learning, especially when compared to the traditional, face-to-face setting. Most instructors and students referred either directly or indirectly to the fact that the blended provision looked less demanding as far as their physical presence was concerned. Not having to physically attend all class meetings seemed to be highly valued by most participants, as they associated this with more efficient time-management, reduced commuting time, and hence to an overall time- and cost-saving alternative to the traditional setting where all classes take place in the physical classroom. The prospect of being in control over allocating their time seemed to be very appealing to most participants. Some participants even pointed out that this enhanced time management may facilitate a more personalised learning mode, with students being in control of determining not only the time of completing a lesson, but also the desired pace, no longer being forced to follow the overall class pace; freed from this constraint, each student would be able to spend more or less time on an online lesson, depending on their own

needs and capabilities. There were also some international students who regarded the time freed from attending classes as an opportunity for sight-seeing and museum visits.

Another time-saving benefit linked to enhanced flexibility was reported by participants - mainly instructors - as they seemed to value the potential re-usability of the material prepared for blended learning provision. Acknowledging that designing the online classes for the blended learning mode will be a significant first-time challenge (see section 6.3.2.1), instructors presumed that, with the necessary adaptations and revisions, the already designed classes may be re-used, hence saving both time and effort.

Finally, and in spite of some concerns about this (see section 6.3.2.2), most participants appeared optimistic about the level of standardisation that might be achieved for the specific multi-section module. Multiple participants reported that, to their perception, blended learning might eventually facilitate consistency across all sections of the module, mainly regarding the online part of the blend, as all module instructors will employ the same set of online activities, already designed and ready to be used - and re-used.

6.4.1.2 Theme 4.A.ii: Attractiveness (13)

This theme surfaced as it became apparent that many participants' comments reflected a certain attraction related to the novel and original nature of blended learning. Many participants reported that blended learning seemed to embrace innovative pedagogy, along with using the latest, up-to-date modern

technologies. Participants referred to blended learning as “trendy”, “cool”, and “great for the tech-savvy generation of digital natives”. Various comments that came from many instructors and one student revealed a hope that the appeal of the ‘high-tech’ nature of blended learning to digital natives might alleviate the challenge of students losing their interest in learning, which was reported as common in the traditional, face-to-face context. Finally, some instructors commented on their potential advantaged position regarding blended learning implementation, compared to instructors of other academic departments; those participants believed that as their subject was computer information systems, their existing familiarity with technology made blended learning even more appealing. It is also important to state at this point that the instructors who had not yet completed the required training seemed keen in doing so as soon as possible.

6.4.1.3 Theme 4.A.iii: Structure (5)

Many instructors praised the structured and organised design imposed by blended learning provision. The instructional designers and the instructor with prior experience with blended learning - as she teaches another module in blended format - explained that the blended learning policy of the College dictates a very organised design for blended modules. This includes pre-planned activities for each class meeting, either online or face-to-face, along with detailed guidelines for feedback to each student for each online lesson. Participants reported that they found this highly organised and structured template reassuring and motivating, and potentially leading to a higher

efficiency and effectiveness of the overall teaching and learning process. In addition, instructors seemed to appreciate the role of instructional designers for the potential conversion of the module to blended mode; their comments showed not only that they acknowledged the expertise of instructional designers in respect to the blended learning mode, but also that they would gladly collaborate with the assigned designer should this conversion eventually take place.

6.4.2 Theme 4.B - Pedagogy (53)

This theme encompasses advantages directly related to teaching and learning. The common attributes that were identified within the relevant data during the analysis enabled further grouping of the data in three subthemes, i.e. “Active Learning”, “Feedback”, and “Motivation and Incentives”.

6.4.2.1 Theme 4.B.i: Active Learning (32)

This theme materialised from comments related to enhanced student engagement and interaction. It was reported by both students and instructors that, in contrast to the traditional face-to-face classroom, in which some students may be nothing more than passive listeners, a blended learning environment seems capable of increasing the level of engagement of students and of stimulating critical thinking. Participants seemed to believe that a blended provision could potentially prompt students to be more active, as they would be expected to complete online activities on their own, involving practical, hands-on assignments. Students’ comments revealed that

completing online research assignments seemed enjoyable and rewarding; in addition to listening to their instructor during face-to-face class time, having to investigate and critically evaluate sources on their own and at their own time was perceived as potentially improving both the efficiency and the effectiveness of the overall learning experience. It was reported that blended learning seemed to invoke skills related to real-life experience, therefore enabling students to directly link abstract concepts with practice. Some participants also reported that teamwork might be better accommodated in a blended learning mode, as technology could facilitate communication and interaction, even for students of a more reserved nature.

6.4.2.2 Theme 4.B.ii: Feedback (12)

Many participants' comments were related to the potential of blended learning to cater for a more efficient and effective process of receiving feedback both from students and from instructors. Instructors perceived blended modality as an effective facilitator for providing feedback; they appeared to believe that the structured framework of blended learning could significantly enhance - and even partially automate - the process of communicating precise and detailed feedback to students regarding assessments and performance, enabling students to have an accurate feeling of their progress. Similarly, participants reported that instructors could also receive feedback from students in a more efficient and productive way. According to the participants' comments, the technology platforms utilised in blended learning could facilitate the process of collecting valuable feedback from students, such as

reports regarding students' participation and performance. This feedback could be used by instructors to adapt and customise their teaching practices in order to better accommodate students, even on a more personalised basis, therefore enhancing the overall teaching and learning process.

6.4.2.3 Theme 4.B.iii: Motivation and Incentives (9)

It was pointed out by both students and instructors that a blended modality might alleviate an issue currently prevalent within the face-to-face educational setting of the module, related to the lack of motivation of students regarding completing formative assignments (see also sections 6.1.1.6, 6.2.1.1, 6.2.1.2.1, and 6.3.1.3). The collected data revealed that currently many students tended to ignore assignments that were not summative, i.e. they did not directly contribute to their overall grade. As already stated in section 1.2.2, the module has two summative assessments, a project and a final examination, so all other activities assigned to students, such as watching a video-tutorial, working in groups to present something in-class, or taking a mock-test, are essentially formative assignments, designed to enable students to practice and therefore to be able to perform well in the summative assessments. According to statements coming from both students and instructors, students have difficulty perceiving the value of formative assignments, and they need these to be directly linked to either a benefit or a penalty; they seemed to understand that formative assignments helped them study and practice, but they tended to consider these as optional, as there was no clear and concrete consequence for not carrying these out. As already

explained in section 1.2.1, the College's policy regarding blended learning states that completion of online activities is regarded as the equivalent of students' presence in the virtual online classroom, so failure to complete the designated assignments results in an absence on that day's class. As there is a limit regarding the allowed absences in all College modules, and exceeding this limit affects the students' overall class grade, participants seemed to perceive this as an effective incentive for completing the formative assignments. It was interesting to notice that many students seemed pleased and even relieved with this, and one student even stated that "many of these [formative assignments] were quite interesting, but when I had to do another [summative] assignment for another module I wouldn't bother with these [the formative ones]... well, if I know that I'll get an absence, I'll have to do these!"

Nevertheless, as already indicated in section 6.3.1.3, one of the participants expressed his concern about this, stating that the motivation for students related to being marked as absent might not be enough.

Figure 6.6 visually portrays the perceived benefits. The overlapping areas include benefits that are shared across classifications; for example, personalised learning can be perceived both as a pedagogy-related benefit, associated to individualised feedback, and as a feature leading to more flexible design.

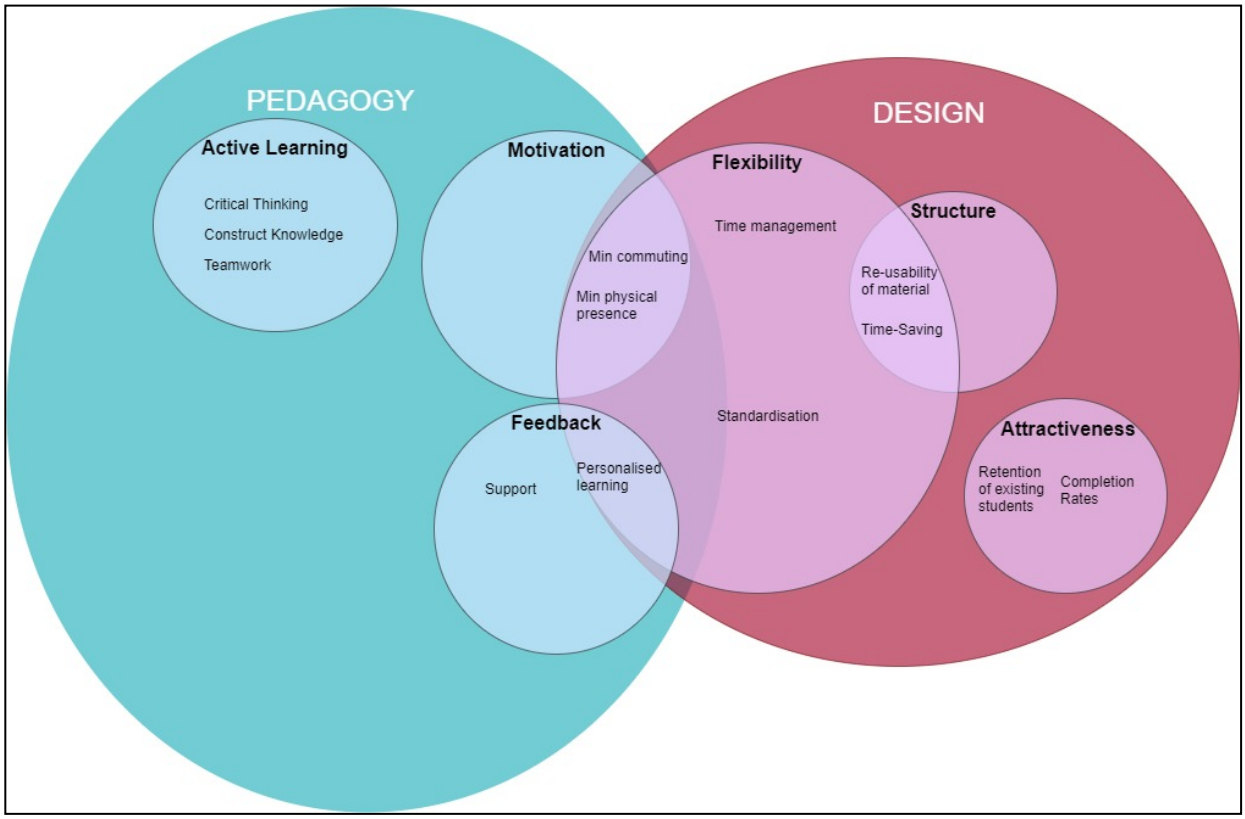


Figure 6.6: Perceived Benefits

The next chapter provides the discussion and analysis of these findings, framed by Passey's (2019) model already explained in Chapter 4

Chapter 7 Analysis and Discussion

As already discussed in Chapter 4 , the theoretical framework driving the discussion of the findings of this research is based on the five critical elements/steps identified by Passey (2016) regarding the implementation of blended learning provision: (1) identification of the features that have to remain face-to-face; (2) identification of the learning outcomes of the remaining features and matching these to a related ‘new’ learning type (PBL, AL, DL, etc.); (3) matching these learning outcomes to ‘new’ learning approaches that can support them (instruction, explanation/illustration, direction, etc.); (4) identification of the enabling educator mode/modes (teacher, tutor, facilitator, guide); and (5) identification of the appropriate supporting technologies. It should be noted that these do not necessarily need to be covered in this particular order.

7.1 Step 1: Elements to be undertaken on Site

This step was addressed by Theme 1 (see section 6.1) which encompassed the module elements that participants perceived as necessary to be delivered in the traditional, face-to-face setting. Table 7-1 summarises these elements.

Theme 1: Features to remain F2F	
Theme 1.A: Sessions requiring direct interaction	*Theme 1.B: Techniques*
i: Challenging Topics	i: E-learning
ii: Introduction to Concepts	ii: Gamification
iii: Hands-on Concepts	
iv: Discussions	
v: Interesting Topics	
vi: Student Presentations	
vii: Office Hours	
viii: Groupwork	

Table 7-1: Elements to be undertaken on Site

7.2 Step 2: Relating the Online Elements to 'New' Ways of Learning

The online elements are conveyed by Theme 2, as the latter refers to the features that, according to the participants of this study, might contribute to an improved learning experience if they move to the online component of the blend (see section 6.2). These elements are summarised in Table 7-2.

Theme 2: Online Features	
Theme 2.A: Pedagogy and Tools	*Theme 2.B: Self-Paced Learning*
i: Formative Assessments	i: Practice Assignments
ii: Study Aids	ii: Basic, Simple Concepts
a) Videos and Tutorials	iii: Flipped-class Activities
b) Empirical – Exploratory Aids	iv: Group Activities
c) Readings	
iii: Gamification	
iv: Simulation Platform	
v: CMS	
vi: Make-up Classes	
vii: Real-time Meetings	
viii: Student Support	

Table 7-2: Elements to move Online

Passey's framework (2016) suggests that each one of these elements should be related to one or more ‘new’ ways of learning, such as problem-based learning (PBL), authentic learning (AL), dialogic learning (DL), situated learning (SL), technology enhanced learning (TEL), networked learning (NL), computer supported collaborative learning (CSCL), and mobile learning (ML).

This section attempts to associate each ‘new’ way of learning with the relevant element(s), taking into consideration the participants’ views regarding each one of Theme 2’s elements. It should be stated at this point that the elements identified in Theme 2 have a certain degree of overlap, as their

grouping as subthemes ‘Pedagogy and Tools’ (2.A) and ‘Self-paced Learning’ (2.B) was aligned with the qualitative rationale underlying thematic analysis; hence, the subthemes that emerged from the common features of the codes allowed for data to be linked to more than one code, which in turn could be linked in more than one theme, depending on the perspective of the theme. For instance, a make-up class (identified as Theme 2.A.vi) can be implemented via a formative assignment (Theme 2.A.i), which in turn may involve an online game-like assignment (Theme 2.A.iii) implemented via a CMS (Theme 2.A.v) or a simulation platform (Theme 2.A.iv). Moreover, practice assignments (Theme 2.B.i) and flipped-class activities (Theme 2.B.iii) may be formative assignments. Similarly, many of these elements may involve a group, collaborative aspect - which is identified separately as Theme 2.B.iv. This overlap is also taken into consideration while relating the elements with the ‘new’ ways of learning.

7.2.1 PBL

The self-directing learning element reported for online formative assessments (Theme 2.A.i), online study aids (Theme 2.A.ii), simulation platforms (Theme 2.A.iv), practice assignments (Theme 2.B.i), and flipped-class activities (Theme 2.B.iii) can be seen as an indicator of PBL. Moreover, Barrows’s (1996) features of PBL, as already discussed in section 4.1.2.1, are evident in these themes:

1) Student-centred learning: According to the participants’ data, students may personalise their learning with many of the suggested online

formative assignments; for instance, in the case of online quizzes, students can re-take these for further practice - or, in the case of formative research assignments, practice assignments, and flipped-class activities, students can choose to use any resources they deem necessary, while it is possible to be guided by their instructor if the need arises. Similarly, students may customise the use of study aids - for instance, they may choose to pause or replay a video tutorial as many times as they wish. In respect to simulation platforms, the very nature of simulations involves student-centred learning, as learners can practice in a safe, simulated environment that they can control.

2) Small student groups: In online group formative practice assignments, students benefit from collaboration with various people, as the composition of groups changes for each assignment. Regarding study aids, participants reported that they appreciated the feature that enables them to collaborate with others by commenting on videos they used as study aids.
3) Educators are tutors: For all five elements, i.e. formative assessments, study aids, simulations, practice assignments, and flipped-class activities, educators serve as ‘tutors’; their presence is not required at all times, but when needed, they are available for guiding and facilitating students.
4) Problem-format: Formative practice assessments are typically assignments related to curriculum units that bridge theory with practice. Moreover, the empirical, exploratory study aids also support problem-

based assignments, as they enable students to explore real-world challenges. Similarly, simulation platforms allow students to work with realistic cases in a controlled, simulated context.

5) Problem-solving skills: As already explained, all five elements enable students to develop problem-solving skills. For instance, during a flipped-class activity, students may use study aids in order to complete a formative, practice assignment; this allows them to self-discover the way to solve the specific problem associated with the assignment.
6) Constructive learning: The self-directed nature of all five elements promotes construction of new information and knowledge, as students learn how to apply theoretical concepts to practical problems.

7.2.2 AL

Online formative assessments (Theme 2.A.i), study aids (Theme 2.A.ii), gamification (Theme 2.A.iii), simulation platform (Theme 2.A.iv), practice assignments (Theme 2.B.i), and flipped-class activities (Theme 2.B.iv) seem to comply to the specifications of Authentic Learning, as these were identified by Donovan *et al.* (1999). These elements frequently rely on real-life applications. Moreover, participants reported that formative practice assessments conducted online, frequently within the context of a flipped-class activity, enable students to self-monitor their learning process, while the nature of specific online formative assessments suggested by the participants - such as online tests, group activities, self- and peer-evaluations, blogs, research assignments, and also game-like assignments - allow students to

construct new knowledge, as students are expected to compare their existing conceptual models with the new factual knowledge required by the assessments.

7.2.3 DL

Taking into consideration the discussion element of dialogic learning, the online elements that can be related to this seem to be gamification (Theme 2.A.iii), CMS use (Theme 2.A.v), real-time meetings (Theme 2.A.vii), student support (Theme 2.A.viii), and group activities (Theme 2.B.iv). Gamification, mainly in the form of online role-playing games, may involve online discussions prompting students to reflect on topics in order to provide effective counter arguments. CMSs may provide the platform for such discussions. In respect to real-time meetings and student support, participants reported that the reason for needing these is exactly to foster learning via discussions between students and instructors. Finally, the collaborative nature of group activities may promote discussions potentially leading to DL.

7.2.4 SL

Online formative practice assessments (Themes 2.A.i. and 2.B.i) of a collaborative nature can be considered a form of situated learning as described by Lave and Wenger (1991), as learning can be achieved while learners interact with the other members of their broader community of practice; aligned to this, online group activities (Theme 2.B.iv) may also foster SL. The same applies for gamification (Theme 2.A.iii), especially role-playing

game-like assignments, and for online simulation platforms (Theme 2.A.iv), as these enable the simulation of real-life environments, therefore allowing learners to gain a real-life experience from a simulated community of practice.

7.2.5 TEL

Given the online nature of all elements in Theme 2, it can be assumed that they can be all associated with TEL; as already stated in section 4.1.2.5, according to Walker *et al.* (2012), any learning system that occurs online can be considered TEL.

7.2.6 NL

The primary characteristic of NL according to Dirckinck-Holmfeld *et al.* (2009), i.e. the use of ICT to promote connections between learners, educators, and learning resources, was indicated by this study's participants as a perceived advantage with respect to technology facilitating communication and interaction (see section 6.4.2.1). Based on the collected data, this feature is evident in all elements in Theme 2, as they all involve interactions with other individuals and/or online resources .

7.2.7 CSCL

Online group activities (Theme 2.B.iv) may foster CSCL as students learn online while working as a group. In addition, many of the online formative practice assessments (Themes 2.A.i. and 2.B.i) suggested by the participants involved a group, collaborative component. Consequently, aligned to the

CSCL description of Stahl et al. (2006) and given that the online nature of these presupposes the use of a computing device, it can be assumed that CSCL is directly related to these elements. Moreover, the collaboration aspect can also be present in online game-like assignments (Theme 2.A.iii), while a CMS (Theme 2.A.v) may provide the necessary platform for this collaboration to occur.

7.2.8 ML

It can be assumed that ML is supported by all elements in this theme, as it is certainly possible for students to employ a mobile device in order to engage with any of the identified online elements identified.

Table 7-3 summarises the association of each online element with the related 'new' ways of learning.

	'New' ways of learning							
Online elements (Theme 2)	**PBL**	**AL**	**DL**	**SL**	**TEL**	**NL**	**CSCL**	**ML**
2.A.i: Formative Assessments	X	X		X	X	X	X	X
2.A.ii: Study Aids	X	X			X	X		X
2.A.iii: Gamification		X	X	X	X	X	X	X

	‘New’ ways of learning							
Online elements (Theme 2)	**PBL**	**AL**	**DL**	**SL**	**TEL**	**NL**	**CSCL**	**ML**
2.A.iv: Simulation Platform	X	X		X	X	X		X
2.A.v: CMS			X		X	X	X	X
2.A.vi: Make-up Classes					X	X		X
2.A.vii: Real-time Meetings			X		X	X		X
2.A.viii: Student Support			X		X	X		X
2.B.i: Practice Assignments	X	X		X	X	X	X	X
2.B.ii: Basic, Simple Concepts					X	X		X
2.B.iii: Flipped-class Activities	X				X	X		X
2.B.iv: Group Activities	X	X	X	X	X	X	X	X

Table 7-3: Association of Online Elements with the 'New' Ways of Learning

7.3 Step 3: Identifying the Appropriate Types of Learning Activities

As already stated in Chapter 4 , the next step of Passey's (2019) framework is to determine the types of learning activities that can more effectively support each online element, while taking into consideration the outcomes of the previous step, which associated each one of these elements with the relevant 'new' way(s) of learning.

Aligned to the guidelines of Passey's (2019) framework, the learning activities considered at this step were the ones suggested by Twining and McCormick (1999, cited in Passey, 2019, p.11): "instruction, explanation/illustration, direction, demonstration, discussion, scaffolding, questioning, speculation, consolidation, summarising, initiating/guiding exploration, or evaluating learners' responses".

As already stated when introducing step 2 above, there is a degree of overlap between the elements of Theme 2. Given the nature of the two broad subthemes within Theme 2, it is possible to consider that the Pedagogy and Tools (Subtheme 2.A) elements are essentially tools and techniques that can be employed online in order to support the features identified within Subtheme 2.B. This factor is taken into consideration for the association of the various types of interactions with the identified online elements. A discussion of these interactions follows, associating each with the respective online elements.

7.3.1 Instruction

As already stated in section 4.1.3.1, Wang (2011) maintains that the term instruction usually implies lectures, during which skills and knowledge are transferred from an educator who already possesses these to one or more individuals. Although this interpretation of instruction does not exclude online delivery, it may be interpreted as presupposing the real-time presence of an educator-expert. Consequently, if this interpretation of the term were to be adopted, most of the identified online elements listed in Theme 2 would be excluded from using this type of interaction. The implied passive status of learners as receivers of information would render the instruction type ineffective for the Self-paced Learning features (Subtheme 2.B), as these require active, self-regulated learners. Similarly, as far as the Pedagogy and Tools elements of Subtheme 2.A are concerned, instruction could be considered suitable only for online Real-time Meetings (Subtheme 2.A.vii) and Student Support Sessions (Subtheme 2.A.viii) as only these fulfil the requirement of an instructor's presence; for the former, the instructor may deliver a lecture online while students participate from a distance, while for the latter, they may hold real-time office hours.

Nevertheless, the view of Reigeluth and Carr-Chellman (2009), also stated in section 4.1.3.1, expands the notion of instruction to include not only the traditional lecture and direct instruction models but also the constructivist and self-learning ones; the scholars choose to regard instruction as anything that facilitates learning. Hence, it can be argued that instruction activities do not

necessarily call for the presence of an instructor. This view is aligned with this study's findings in respect to Theme 4 - Perceived Benefits, and in particular 4.B.i - Active Learning and 4.B.iii - Motivation and Incentives (see section 6.4). Consequently, it can be argued that all the online elements within the Subtheme Self-paced Learning (2.B) may benefit from instruction, as they are all related to self-directed learning. Likewise, all the elements of the Subtheme Pedagogy and Tools' (2.A), being essentially tools and techniques, may be employed to support instruction, in its broader, self-directed sense. For instance, students receive and construct knowledge while practicing with formative assessments, or while using study aids, or while participating in online game-activities, or while experiencing an interactive, simulated activity.

7.3.2 Explanation/illustration

Given the characteristics of explanation/illustration according to Norris *et al.* (2005) and Passey (2014) (see section 4.1.3.2), it can be deduced that the self-directing nature of the online elements of Subtheme 2.B do not promote this type of interaction. Nevertheless, some of the tools of Subtheme 2.A may be considered suitable for supporting this learning activity. In particular, Study Aids (Subtheme 2.A.ii) and Simulation Platforms (Subtheme 2.A.iv) seem to comply to all four features of explanation/illustration identified by Norris *et al*. (2005), as they may assist students by: assigning the meaning of a concept, therefore answering questions of type 'what is'; justifying something, appealing to standards or norms, hence answering questions of type 'why'; describing a concept; and providing an account of what caused something.

Analogously, instructors have the chance to explain and clarify concepts to students during online Real-time Meetings (Subtheme 2.A.vii) and during online office hours as Student Support (Subtheme 2.A.viii).

7.3.3 Direction

As already explained in section 4.1.3.3, direction involves providing the students with the necessary guidelines to understand the objective of an activity and allowing them to decide on an appropriate way of completing it (Laurillard, 2002; Passey, 2014). Although a first interpretation of the term might imply the need of an instructor for providing these guidelines, it was evident from this study's data that a digital, online agent was also perceived by the participants as an effective means of providing direction to students - it was even reported as a perceived benefit that students might be more motivated to complete an assignment if directions are provided online (see section 6.4.2.3). Based on the participants' views, the self-pacing nature of the online elements of Subtheme 2.B renders these ideal for this type of interaction. With respect to Basic, Simple Concepts (Subtheme 2.B.ii) and to Flipped-class Activities (Subtheme 2.B.iii), it should be noted that the participants' reported preference for an online mode was essentially attributed to the direction strategy involved.

Moreover, the following tools from Subtheme 2.A seem capable of supporting direction: Formative Assessments (2.A.i), as these are typically assigned to the students with a set of guidelines, and then students need to complete them on their own; Simulation Platforms (2.A.iv), as these allow the students

to experiment while providing guidelines and feedback; and Real-time Meetings (2.A.vii) and Student Support (2.A.viii), as these enable educators to guide their students and provide them with the necessary feedback for completing a learning activity.

7.3.4 Demonstration

As stated in section 4.1.3.4, demonstration aligns with constructivist learning theory, and is considered a very effective educational strategy as it can leave an exciting impression on students (Kauffman, 1990). Passey (2014) suggests that an educator is typically the one providing the demonstration; however, analogously to the direction interaction described above, it was revealed by the collected data that demonstration of concepts was perceived as feasible - and in some cases even preferable - to occur online. Based on the findings, all elements of Subtheme 2.B (Self-paced Learning) involve a certain degree of demonstration.

In respect to the tools of Subtheme 2.A, the collected data revealed demonstration-related features in Study Aids (Subtheme 2.A.ii), Gamification (Subtheme 2.A.iii), and Simulation Platforms (Subtheme 2.A.iv). Moreover, educators may demonstrate concepts during Real-time Meetings (Subtheme 2.A.vii) and Student Support Sessions (Subtheme 2.A.viii).

7.3.5 Discussion

Discussions are certainly not limited to a face-to-face setting (J. Clark, 2001); however, as discussed in section 4.1.3.5, the interactive nature of discussion

creates a requirement for real-time communication. Consequently, as far as the tools of Subtheme 2.A are concerned, only Real-time Meetings (Subtheme 2.A.vii) and Student Support (Subtheme 2.A.viii) seem to qualify for this type of interaction. As far as the online elements of Subtheme 2.B are concerned, it may be argued that their self-paced nature is in contrast with the interactivity requirement of discussions; nevertheless, participants reported as a perceived benefit that Group Activities (Subtheme 2.B.iv) might prompt students to engage in productive real-time discussions (see section 6.4.2.1).

7.3.6 Scaffolding

As already stated in section 4.1.3.6, scaffolding is one more technique that requires the presence of a teacher, without excluding the online setting. Real-time interaction is not a necessity, and the collected data revealed that scaffolding might be employed in all elements in Subtheme 2.B. It was evident from the participants' data that the self-paced nature of these elements might allow the educators to provide guidance only when needed, and to eventually withdraw from the process as the students become more confident and eventually control their own learning pace. It should be noted that the flexibility that Dennen (2003) associated with scaffolding, mainly with respect to enabling students to customise and adapt their learning according to their own needs, also emerged as a perceived benefit for blended learning (see section 6.4.1.1).

Formative Assessments (Subtheme 2.A.i) might employ scaffolding as they might allow the educator to provide a set of steps or frameworks for students

to follow. Similarly, a CMS (Subtheme 2.A.v) might promote scaffolding, as it allows educators to set up reminders and task management settings for their students. Analogously, educators might employ scaffolding during Real-time Meetings (Subtheme 2.A.vii) and Student Support sessions (Subtheme 2.A.viii).

7.3.7 Questioning

Aligned to the views of Yang, Newby, and Bill (2005) concerning the potential of utilising questioning in a virtual learning environment, which are already presented in section 4.1.3.7, the collected data revealed that this form of interaction can be supported by Simulation Platforms (Subtheme 2.A.iv), CMSs (Subtheme 2.A.v), Real-time Meetings (Subtheme 2.A.vii) and Student Support (Subtheme 2.A.viii). Moreover, the findings revealed that the asynchronous nature of the online elements of Subtheme 2.B does not necessarily exclude questioning, as the participants suggested that contemplative questions might be employed in self-paced elements. This was also evident in one of the perceived pedagogy-related benefits linked to critical thinking and active learning (see section 6.4.2.1).

7.3.8 Speculation

Aligned to constructivist learning theory, the deductive nature of speculation promotes construction of knowledge, as students can come up with new ways of thinking and formulate new ideas (J. Ross, 2017). As already stated in section 4.1.3.8, speculation typically involves a teacher presenting students

with a scenario which affords multiple outcomes, and students are expected to contemplate on the given premises and deduce a way to address the scenario's case (Passey, 2014). This type of interaction requires neither the physical presence of an educator nor a real-time interaction; hence, it might be employed in all self-paced learning elements of Subtheme 2.B. Moreover, all tools and pedagogical strategies of Subtheme 2.A might support speculative reasoning, as they all allow the educator to provide scenarios to the students, who in turn will be able to address these by relying on assumed shared knowledge, as Parisi (2012) suggests for speculation.

It is noteworthy to point out that based on the collected data, Active Learning (Subtheme 4.B.i), identified as a perceived benefit of blended learning, can be associated with speculation, as it was implied by the participants that contemplation on possible solutions stimulated critical thinking and promoted engagement, fostering active learning.

7.3.9 Consolidation

Passey (2014) explains that consolidation typically involves an educator reviewing an already-covered topic, aiming to evaluate students' learning in respect to that topic. As already stated in section 4.1.3.9, consolidation usually occurs at the end of a lesson, in order to promote retention of information, hence leading to construction of knowledge. Similar to other interaction forms, consolidation is neither limited by real-time constraints nor does it require the physical presence of an educator.

In this study's data, there was no direct or indirect reference to consolidation for the self-paced learning elements of Subtheme 2.B. Nevertheless, the collected data revealed that consolidation might be implemented not only by an educator during real-time meetings (Subtheme 2.A.vii) and student support sessions (Subtheme 2.A.viii), but also by digital agents, via the use of a CMS (Subtheme 2.A.v), simulation platforms (Subtheme 2.A.iv), pre-recorded videos (Subtheme 2.A.ii), and online game-like sessions (Subtheme 2.A.iii). Moreover, consolidation might also be possible for online sessions acting as make-up classes (Subtheme 2.A.vi).

7.3.10 Summarising

As already stated in section 4.1.3.9, summarising is a popular teaching strategy that can be effectively employed in both face-to-face and online settings (Ellis *et al*., 2009; Garrison, 2003). It involves assimilating together the key points of a learning experience, aiming to strengthen their learning by the students (Reigeluth & Carr-Chellman, 2009); not unlike other forms of interaction presented here, summarising can be implemented by either an educator or a digital agent.

The collected data revealed that participants associated summarising primarily with Real-time Meetings (Subtheme 2.A.vii) and Student Support (Subtheme 2.A.viii), in which an educator might directly interact with students. Nevertheless, taking into account Collins *et al.*'s (1989) view, which relates summarising with self-monitoring and self-evaluation, it can be argued that tools such as formative practice assignments (Subthemes 2.A.i and 2.B.i),

Simulation Platforms (Subtheme 2.A.iv) and CMS (Subtheme 2.A.v) might also support summarising, as they allow students to assess their knowledge after drawing together the key points of a learning experience.

7.3.11 Initiating/guiding Exploration

As already stated in section 4.1.3.11, this form of interaction involves an introduction to a topic - typically by an educator - followed by suggestions of possible ways for further exploration (Passey, 2014). Participants reported that students had the opportunity to explore and discover new knowledge by using game-like sessions such as computer programming games (Subtheme 2.A.iii) and the module's simulation platform (Subtheme 2.A.iv). This finding is in agreement with the view of De Gloria, Bellotti, and Berta (2014), who support that digital serious games are aligned with constructivist learning theories as they enable learners to acquire new knowledge through exploration, either individually or in groups.

In addition, it should be noted that the fundamental characteristic of initiating and guiding exploration, i.e. encouraging students to learn about a topic while exploring and identifying aspects that link to their individual interests and goals (A. Collins *et al*., 1989), matches the self-paced nature of the elements in Subtheme 2.B.

7.3.12 Evaluating Learners' Responses

As already stated in section 4.1.3.12, this form of interaction is associated with the provision of feedback to students, aiming to allow educators to

evaluate not only what the students learned, but also how they learned it; via this interaction, educators may customise their pedagogy to better accommodate student needs (Passey, 2019). The collected data revealed that participants highly valued this interaction, and although it was conveyed that providing feedback for the blended component of the module may burden the educators with additional responsibilities and workload (see section 6.3.1.2), participants also reported perceiving it as one of the key benefits of blended learning (see section 6.4.2.2). Moreover, participants seemed to perceive the provision of scheduled and detailed feedback as one of the main factors associated with the ‘structure’ benefit (see section 6.4.1.3). In particular, the participants seemed to associate evaluation and feedback with Practice Assignments (Subtheme 2.B.i), with Flipped-class Activities (Subtheme 2.B.iii), and with Group Activities (Subtheme 2.B.iv).

With respect to the tools that might support this form of interaction, CMSs (Subtheme 2.A.v) have specially designed instruments that allow educators to provide detailed feedback for students’ assignments.

Table 7-4 summarises the identified online elements with the respective interaction types.

	Interaction Types											
Online Elements (Theme 2)	**Instruction**	**Explanation**	**Direction**	**Demonstration**	**Discussion**	**Scaffolding**	**Questioning**	**Speculation**	**Consolidation**	**Summarising**	**Initiating exploration**	**Evaluating**
2.A.i: Formative Assessments	X		X			X		X		X		
2.A.ii: Study Aids	X	X		X				X	X			
2.A.iii: Gamification	X			X				X	X		X	
2.A.iv: Simulation Platform	X	X	X	X			X	X	X	X	X	
2.A.v: CMS	X					X	X	X	X	X		X
2.A.vi: Make-up Classes	X							X	X			
2.A.vii: Real-time Meetings	X	X	X	X	X	X	X	X	X	X		
2.A.viii: Student Support	X	X	X	X	X	X	X	X	X	X		
2.B.i: Practice Assignments	X		X	X		X	X	X		X	X	X
2.B.ii: Basic, Simple Concepts	X		X	X		X	X	X			X	
2.B.iii: Flipped-class Activities	X		X	X		X	X	X			X	X
2.B.iv: Group Activities	X		X	X	X	X	X	X			X	X

Table 7-4: Association of Online Elements with Types of Interaction

7.4 Step 4: Identifying the Appropriate Educator Mode

Passey (2019) suggests that the next step after associating the interaction types with the online elements is to identify the relevant online educator modes, choosing from teacher, tutor, facilitator, and guide - see section 4.1.4

for a summary of the key characteristics of these pedagogical roles of educators.

Table 4-3 of the same section presents Passey's (2019) association of these modes with the relevant forms of interaction. Drawing from this association, Table 7-5 expands on the data of Table 7-4 by also integrating the relevant educator modes using a colour coding system for the four modes, i.e. blue for 'Teacher', red for 'Tutor', green for 'Facilitator', and yellow for 'Guide'. In essence, this table cross tabulates the online elements with not only the interaction types but also with the educator modes. To illustrate what Table 7-5 shows, based on this study's findings, the interaction types found suitable for formative assessments are instruction, direction, scaffolding, speculation, and summarising; therefore, the row for formative assessments in Table 7-5 has 'X' symbols in the respective columns representing these interaction types. The number and colour of these 'Xs' reveals the respective number and type of educator modes that can be employed to support these interaction types. This information is drawn from Table 4-3, so, for the specific example, it can be seen that the educator modes that may support the instruction interaction form are teacher, tutor and guide, while the ones that may support direction seem to be teacher and guide. Similarly, one can identify the relevant educator modes for the other interaction forms. Therefore, the intersection of the 'formative assessments' row with the 'instruction' column in Table 7-5 shows three 'Xs', a blue one representing the 'Teacher' role, a red one for the 'Tutor' role, and a yellow one for the 'Guide' role. Similarly, the

intersection of the same row with the ‘direction’ column shows only two ‘Xs’, a blue one for the ‘Teacher’ role and a yellow one for the ‘Guide’ role.

This table may be employed as a guide with respect to identifying or selecting an appropriate combination of interaction types and educator role that might be employed for implementation of one or more online elements of the blend. As an indicative example, in order to implement a formative assessment, an educator might choose to *instruct* students on how to use these, by assuming a teacher, tutor or guide role; at a later stage, the educator might choose to *summarise* the assessment, in which case a tutor or guide mode would be more appropriate and effective. The same table can be used from the perspective of a chosen interaction type; for instance, if an educator wishes to *instruct* students about something, he/she may choose to use an online game session, so the table informs the educator about the possible appropriate educator modes being a teacher, tutor, or guide.

Online Elements (Theme 2)	Interaction Types / Educator Modes (Teacher, Tutor, Facilitator, Guide)																					
	Instruction		Explanation		Direction		Demonstration		Discussion		Scaffolding		Questioning		Speculation		Consolidation		Summarising		Initiating exploration		Evaluating	
2.A.i: Formative Assessments	x	x			x						x	x				x				x				
		x				x					x	x			x					x				
2.A.ii: Study Aids	x	x	x	x			x	x								x	x	x						
		x	x												x		x							
2.A.iii: Gamification	x	x					x	x								x	x	x				x		
		x													x		x				x	x		
2.A.iv: Simulation Platform	x	x	x	x	x		x	x					x	x		x	x	x		x		x		
		x	x			x							x	x	x		x			x	x	x		
2.A.v: CMS	x	x									x	x	x	x		x	x	x		x			x	x
		x									x	x	x	x	x		x			x			x	x
2.A.vi: Make-up Classes	x	x														x	x	x						
		x													x		x							
2.A.vii: Real-time Meetings	x	x	x	x	x		x	x		x	x	x	x	x		x	x	x		x				
		x	x			x			x	x	x	x	x	x	x		x			x				
2.A.viii: Student Support	x	x	x	x	x		x	x		x	x	x	x	x		x	x	x		x				
		x	x			x			x	x	x	x	x	x	x		x			x				
2.B.i: Practice Assignments	x	x			x		x	x			x	x	x	x		x				x		x	x	x
		x				x					x	x	x	x	x					x	x	x	x	x
2.B.ii: Basic, Simple Concepts	x	x			x		x	x			x	x	x	x		x						x		
		x				x					x	x	x	x	x						x	x		
2.B.iii: Flipped-class Activities	x	x			x		x	x			x	x	x	x		x						x	x	x
		x				x					x	x	x	x	x						x	x	x	x
2.B.iv: Group Activities	x	x			x		x	x		x	x	x	x	x		x						x	x	x
		x				x			x	x	x	x	x	x	x						x	x	x	x

Table 7-5: Association of Online Elements with Types of Interaction and Educator Modes

7.5 Step 5: Identifying the Appropriate Technologies

The final step towards implementing a blended learning provision is to determine the appropriate technologies that might support the identified online elements, considering their relation to ‘new’ ways of learning (Passey, 2019). Table 4-2 in Chapter 4 presents the categorisation of technology resources linked to the various ‘new’ ways of learning, as suggested by Passey (2017, 2019). Taking into consideration both the outcomes of the previous steps and Passey’s (2017, 2019) suggested categorisation of technology resources, Table 7-6 was developed as the result of incorporating the information from Table 4-2 into Table 7-3, following a similar process to the one described above for Table 7-5. Once more, colour coding was employed; ‘Topic-specific resources and software’ are represented by a blue ‘X’, ‘Curriculum-wide learner-centred software’ by red, ‘Curriculum-wide tutor-centred software’ by green, and ‘Online learner support’ by yellow. Analogously to Table 7-5, this table could also be employed as a tool to guide educators with respect to identifying and selecting suitable technologies that they might utilise with a specific online element, depending on the ‘new’ learning form they wish to promote. Using, once more, formative assessments as an indicative example to illustrate the potential use of this tool, an educator who might wish to promote PBL with a formative assessment might employ a technology resource from any of the four categories, as PBL is supported by all four. As already explained, this information is related from Table 4-2; in another context, when there is a need to promote NL with a formative assessment, an online learner support resource appears to be more appropriate.

Online Elements (Theme 2)	'New' Ways of Learning / Digital Technology Resource Categories (topic-specific resources & s/w, curriculum-wide learner-centred s/w, curriculum-wide tutor-centred s/w, online learner support)															
	PBL		AL		DL		SL		TEL		NL		CSCL		ML	
2.A.i: Formative Assessments	X	X	X				X		X	X					X	X
	X	X	X				X	X	X	X		X	X	X	X	X
2.A.ii: Study Aids	X	X	X						X	X					X	X
	X	X	X						X	X		X			X	X
2.A.iii: Gamification			X				X		X	X					X	X
			X			X	X	X	X	X		X	X	X	X	X
2.A.iv: Simulation Platform	X	X	X				X		X	X					X	X
	X	X	X				X	X	X	X		X			X	X
2.A.v: CMS									X	X					X	X
						X			X	X		X	X	X	X	X
2.A.vi: Make-up Classes									X	X					X	X
									X	X		X			X	X
2.A.vii: Real-time Meetings									X	X					X	X
						X			X	X		X			X	X
2.A.viii: Student Support									X	X					X	X
						X			X	X		X			X	X
2.B.i: Practice Assignments	X	X	X				X		X	X					X	X
	X	X	X				X	X	X	X		X	X	X	X	X
2.B.ii: Basic, Simple Concepts									X	X					X	X
									X	X		X			X	X
2.B.iii: Flipped-class Activities	X	X							X	X					X	X
	X	X							X	X		X			X	X
2.B.iv: Group Activities	X	X	X				X		X	X					X	X
	X	X	X			X	X	X	X	X		X	X	X	X	X

Table 7-6: Association of Online Elements with 'New' Ways of Learning and Technology Categories

The next and final chapter will summarise the conclusions of this thesis's research.

Chapter 8 Conclusions

8.1 Answering the Research Questions

The findings of this case study were explored using a pragmatic approach, driven by my personal point of view as a practitioner, aiming to corroborate my own teaching practice, and to support other practitioners.

The main research question of this thesis was “What are the prospects and implications of a transition towards blended learning in an introductory computer information systems module at college level?”, while the emerging secondary questions were “How can students’ and instructors’ perceptions and responses to the potential transition be used to evaluate the implementation of this blended learning model?”, “What key features should a blended learning model entail when implemented in an introductory computer module such as ‘Introduction to Information Systems’?”, and “What are the benefits and drawbacks of blended learning models in higher education?”

Aiming to address these questions, this qualitative single exploratory case study explored the potential transition of a specific module of College X to a blended learning mode. Figure 8.1 visually portrays the research questions and how these were addressed within the context of this study. With respect to the first sub-question, the implementation of this case study was performed by investigating the perceptions of instructors and students regarding this potential transition and analysing these perceptions using thematic analysis. The second sub-question was addressed by framing these perceptions with

the conceptual framework suggested by Passey (2019) in terms of integrating ‘new’ ways of teaching and learning for implementing blended learning provision for higher education. To achieve this, Passey’s (2019) recommended steps were followed: the module elements that should remain on site were directly identified from Theme 1 of the data findings, then the online elements from Theme 2 were associated with relevant ‘new’ ways of learning; these associations were used to identify first the suitable interaction forms, then the appropriate educator modes, and finally the appropriate technologies that might be employed to support the identified online elements.

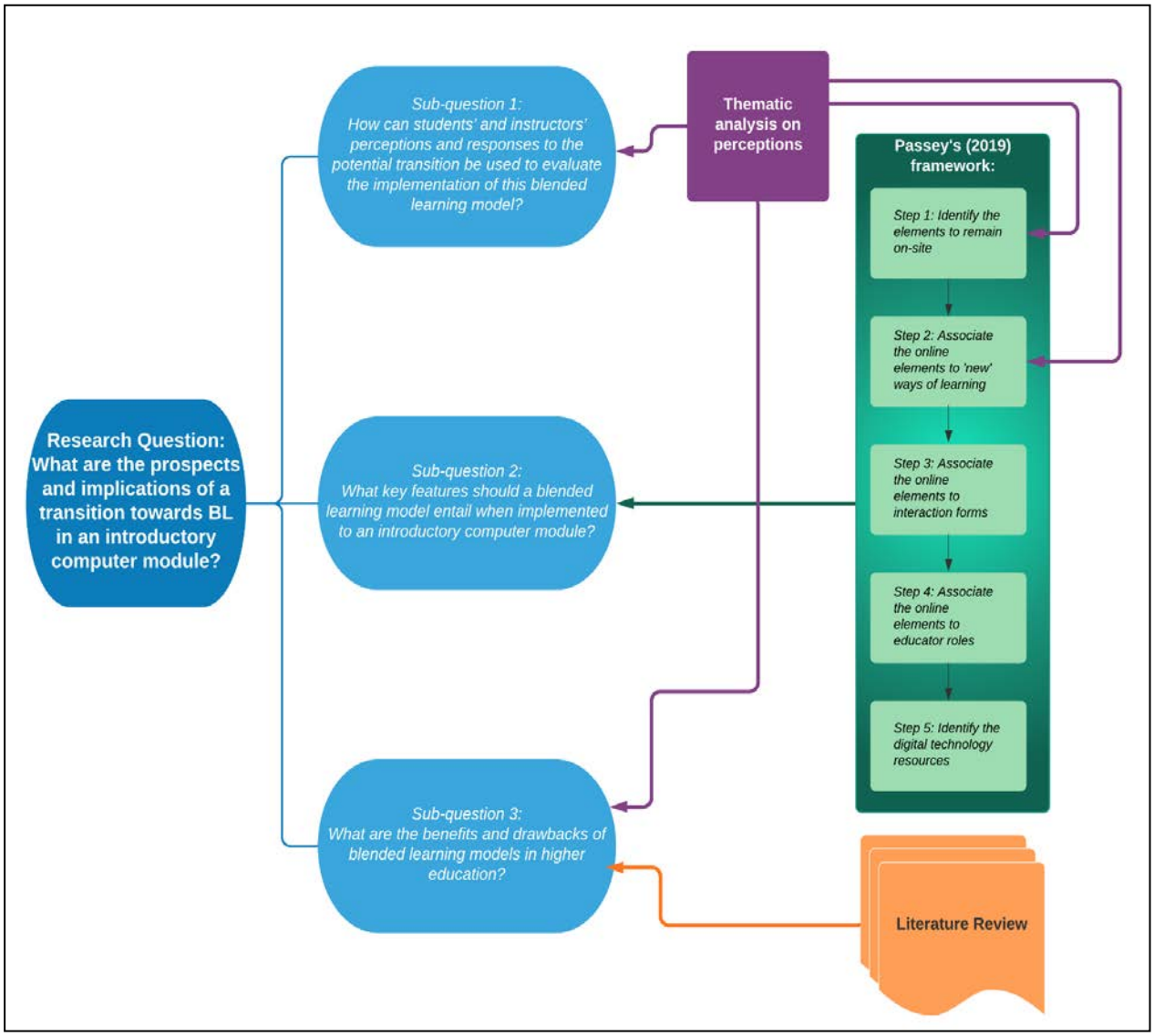


Figure 8.1: Overall Process

Finally, the third sub-question regarding the benefits and drawbacks of blended learning models in higher education was answered via review of the existing literature which also framed Theme 4 of the data findings (see sections 3.3.2 and 3.3.3 of Chapter 3 and sections 6.4 and 6.3 of Chapter 6 respectively). In an attempt to assimilate the benefits identified from both the literature review and the findings, a visual representation of the collection of these is presented in Figure 8.2. The aim was to portray not simply a list of the benefits but also their interrelationships and commonalities, merging the

common ones, while integrating the classifications of both the literature review and the data findings. The resulting Venn diagram is essentially an enriched version of Figure 6.6; the main groups are the ones that emerged from the findings, i.e. design-related (Subtheme 4.A) and pedagogy-related (Subtheme 4.B); these also integrate the elements identified from the literature. As can be seen, there are a few benefits such as increased participation and enhanced peer-to-peer learning that were not explicitly revealed by the findings. Nevertheless, most of these were hinted at by the participants. Moreover, the 'Convenience' sub-group was added to the 'Structure' node, incorporating some of the benefits already revealed.

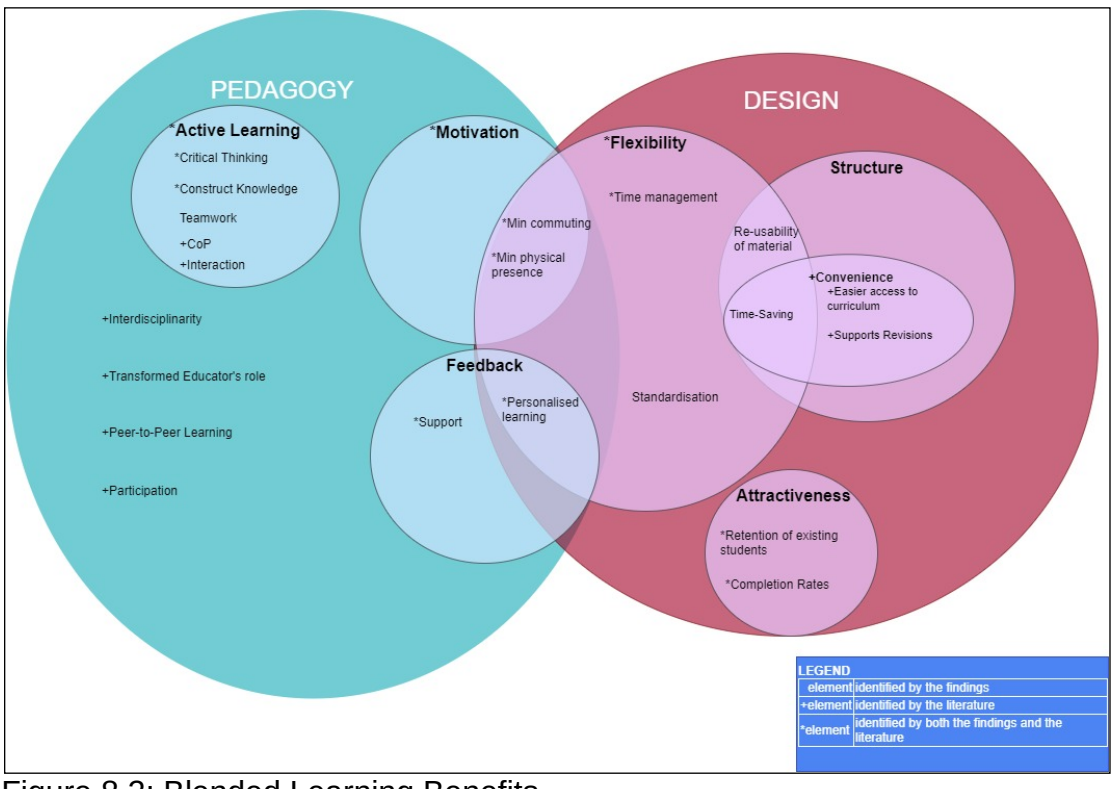


Figure 8.2: Blended Learning Benefits

A similar Venn diagram, displayed in Figure 8.3, was created to represent the challenges related with blended learning provisions, as these were identified

by both the literature review and the data findings (see sections 3.3.3 and 6.3 respectively). This is an enriched version of Figure 6.4 - the main groups are once more the ones that emerged from the data findings, addressing issues related to teaching/learning pedagogy (Subtheme 3.A) and to implementation (Subtheme 3.B); the challenges identified by the literature review were fully aligned to those of the data findings, so for the creation of this diagram all challenges were associated and/or merged with each other. Analogously to the advantages diagram, the overlapping areas of the circles show the challenges that are shared between the two main categories, such as some institutional/personal culture barriers and issues related to implementation of blended learning provision when this is done for the first time. For instance, institutional support seems to be both a pedagogical concern and a practical implementation issue; similarly, lack of experience and resistance to change may become barriers with respect to both practical implementation and teaching and learning strategies.

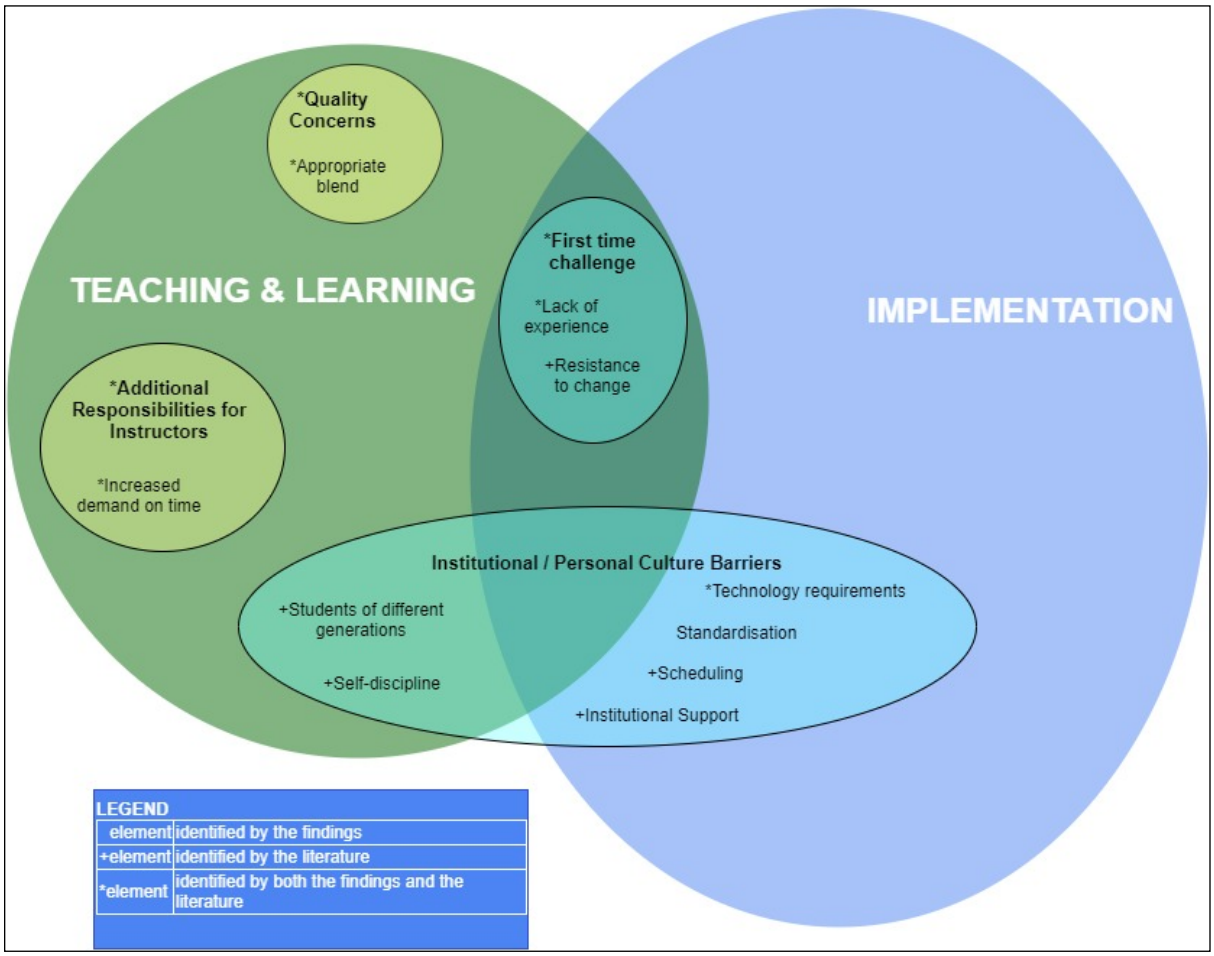


Figure 8.3: Blended Learning Challenges

These challenges are addressed in the next section, as this study's contribution is discussed.

8.2 Contributions

8.2.1 Actual Implementation for the 'Introduction to Information Systems' Module

As this case study is directly related to my own work practice, a main contribution lies in the actual use of this study's findings towards the eventual conversion of the 'Introduction to Information Systems' module to blended learning; this pragmatic contribution is aligned to other case studies investigating education-related aspects that informed the researchers' work practice, such as Stone and Perumean-Chaney's (2011) case study exploring benefits of online teaching for traditional classroom pedagogy, and Surber's (2016) doctoral thesis case study which investigated e-learning factors influencing training strategies at a higher educational institution.

Within the context of the module under investigation in this case study, the elements that need to remain on-site and the ones that will move online are now clear, along with a detailed analysis of the relevant pedagogy and tools, hence alleviating a 'Quality Concerns' challenge. The only decision that yet needs to be made involves the actual percentage of the module that will eventually move online; this needs to be done at a departmental level, taking into consideration the relevant guidelines of College X. Moreover, the responsibilities of instructors will also be determined at a departmental level, with the assistance of the College's instructional designers' team, acknowledging the instructors' concern related to additional workload.

Furthermore, as far as the first-time challenges are concerned, this may be moderated by the fact that all instructors of this module have been involved as participants in this study; my colleagues have become familiar with blended learning during this study, even as a concept, so there are more chances of

them embracing the new modality, minimising the first-time challenges related to resistance to change and lack of experience.

Finally, the barriers related to institutional and/or personal culture may also be mitigated, at least to a certain degree. The pedagogy-related ones may be effectively addressed by the identified ‘new’ ways of learning, as these are associated with the respective interaction forms, educator roles, and technologies. With respect to the barriers related to practical implementation, it is true that there are some that are beyond departmental jurisdiction; nevertheless, the institution will be made aware of these, and it should be noted that even acknowledging their presence is a key factor contributing to the successful overall implementation.

8.2.2 Generalisability of this Case Study

Generalisability has been pointed out as a potential limitation for the case study research design, at least in the conventional sense (Eisenhardt, 1989; Hodkinson & Hodkinson, 2001; Yin, 2009). Nevertheless, the specific findings of this case study, which relate to the process involved, may be appropriately applied for implementing the transition to blended modes of any module of a similar nature to the one used for this case study, i.e. for an introductory computer module. Moreover, the presented process regarding the implementation of a blended learning provision transition of an existing module to blended mode following Passey’s (2019) steps may also be applied to any higher education module, regardless of their level, context, department, or institution. I therefore believe that this is of significant value for any

academic institution, as it will facilitate the process of designing and converting blended learning modules. In particular, this step-by-step process may be used to inform and update the existing blended learning guidelines of College X.

8.2.3 Research Contribution

A contribution of this study is related to the two tables created in order to identify the appropriate educator modes and technologies for the online elements of the blend for Passey's (2019) steps 4 and 5 respectively (see sections 7.4 and 7.5). Both tables may be utilised by educators as tools to support their teaching and learning strategies; consequently, they may serve as conceptual frameworks for future research on this subject, as novel models to this research field. Table 7-5 is of value for decisions regarding suitable educator modes and interaction types for specific online elements; as explained in section 7.4, this table may be read using any of its three dimensions: online element, educator mode, interaction type, as it informs educators about possible roles they may assume for a given interaction type, for a specific online element of the blend. Similarly, Table 7-6 may be employed as a tool to determine the appropriate 'new' way of learning and uses of digital resources for specific online elements.

Along the same lines, and abiding once more to the embraced pragmatism paradigm, Figures 8.1, 8.2, and 8.3 may be considered as contributions to the field, as they offer specific models related to blended learning development of a module, that can be related to other contexts by other researchers.

Yet another research contribution involves the survey of literature related to the history of the use of technology in education presented in Chapter 2; this provides a timeline with key milestones of technology evolution related to their effect on education, so it can inform scholars interested in this subject.

Finally, it should be noted that the blended model presented in this study involved a combination of face-to-face and online settings; nevertheless, the switch to fully online teaching imposed by the COVID-19 pandemic revealed the need for a new blended model, as face-to-face classes are no longer a viable option, being replaced by synchronous online meetings. A new blended model has emerged, dictating a combination of synchronous and asynchronous online modes. As the timing of the completion of this study coincided with the rise of this new model, its findings may be implemented and/or adapted to accommodate this new blend, leading the way to further research in this field.

8.3 Limitations

A potential limitation of the case study as a research design pertains to the high volume of data that has to be analysed (Hodkinson & Hodkinson, 2001). In order to alleviate this weakness, after careful consideration and consultation with all instructors of the module under investigation, it was deemed fitting to collect student data from just a few sections of the module; this turned out to be effective, as the amount of collected data proved to be manageable size-wise but rich content-wise.

Another known limitation of the case study design is related to doubts about the researcher's objectivity (Hodkinson & Hodkinson, 2001). As stated from the very beginning, I am an instructor of the module under investigation, and every effort was made to minimise possible personal bias, including asking a colleague to conduct one of the focus groups, and consulting my colleagues about the themes that resulted following the data analysis. Moreover, it could be argued that my personal involvement with the module constitutes one of the strong assets of this case study, as there is evidence from the literature that case studies are more sound when researcher expertise and intuition are maximised (Hodkinson & Hodkinson, 2001; Yin, 2009).

Yet another limitation has to do with the choice of thematic analysis; as stated by Boyatzis (1998), thematic analysis can be time- and energy-consuming, especially compared to quantitative techniques. This was a critical challenge for me, and one of the reasons that this study took more time than originally planned.

As a final and on a more personal note, I would like to share that balancing the load between work, research, family, and personal life proved to be the most challenging barrier that I had to overcome. Nevertheless, the satisfaction of completing this study is immense, and looking back, I can now say that the overall experience of conducting this study was challengingly enjoyable.

References

Abello, C. A. M. (2018). *How professional development in blended learning influences teachers' self-efficacy*. [Doctoral dissertation, Grand Canyon University]. Retrieved from ProQuest (10839012).

AECT. (2001). *AECT in the 20th century: A brief history*. Retrieved July 1, 2018, from https://aect.org/aect_in_the_20th_century_a_br.php

Alavi, M. (2019). Computer-mediated learning: An empirical evaluation. *MIS Quarterly*, *18*(2), 159–174.

Alexander, R. J. (2017). *Towards dialogic teaching: Rethinking classroom talk* (5th ed.). Cambridge: Dialogos.

Allen, E. I., Seaman, J., & Garrett, R. (2007). *Blending in: The extent and promise of blended education in the United States*. Needham, MA: Sloan-C.

Anderson, T., Rourke, L., Garrison, D. R., & Archer, W. (2001). Assessing teaching presence in a computer conferencing context. *Journal of the Asynchronous Learning Network*, *5*(2), 1–17.

Baepler, P., Walker, J. D., & Driessen, M. (2014). It's not about seat time: Blending, flipping, and efficiency in active learning classrooms. *Computers & Education*, *78*, 227–236. https://doi.org/10.1016/j.compedu.2014.06.006

Barrows, H. S. (1996). Problem-based learning in medicine and beyond: A brief overview. *New Directions for Teaching and Learning*, *68*, 3–12. https://doi.org/10.1002/tl.37219966804

Bates, T. (2014). MOOCs: Getting to know you better. *Distance Education*, *35*(2), 145–148. https://doi.org/10.1080/01587919.2014.926803

Benjamin, L. T. Jr. (1988). A history of teaching machines. *American Psychologist*, *43*(9), 703–712.

Benson, A. D. (2002). Using online learning to meet workforce demand: A case study of stakeholder influence. *Quarterly Review of Distance Education*, *3*, 443–452.

Bermejo, S. (2005). Cooperative electronic learning in virtual laboratories through forums. *IEEE Transactions on Education*, *48*(1), 140–149.

Bernard, R. M., Abrami, P. C., Borokhovski, E., Wade, C. A., Tamim, R. M., Surkes, M. A., & Bethel, E. C. (2009). A meta-analysis of three types of interaction treatments in distance education. *Review of Educational*

Research, *79*(3), 1243–1289. https://doi.org/10.3102/0034654309333844

Bernard, R. M., Borokhovski, E., Schmid, R. F., Tamim, R. M., & Abrami, P. C. (2014). A meta-analysis of blended learning and technology use in higher education: From the general to the applied. *Journal of Computing in Higher Education*, *26*, 87–122. https://doi.org/10.1007/s12528-013-9077-3

Bernard, R. M., Brauer, A., Abrami, P. C., & Surkes, M. (2004). The development of a questionnaire for predicting online learning achievement. *Distance Education*, *25*(1), 31–47. https://doi.org/10.1080/0158791042000212440

Black, H. (1967). *The American schoolbook*. New York, NY: Morrow.

Blatter, J. K. (2008). Case study. In L. M. Given (Ed.), *The SAGE encyclopedia of qualitative research methods* (pp. 68–71). Thousand Oaks, CA: Sage. https://doi.org/10.4135/9781412963909

Boelens, R., De Wever, B., & Voet, M. (2017). Four key challenges to the design of blended learning: A systematic literature review. *Educational Research Review*, *22*, 1–18. https://doi.org/10.1016/j.edurev.2017.06.001

Boelens, R., Laer, S. Van, De Wever, B., & Elen, J. (2015). *Blended learning in adult education: Towards a definition of blended learning*. Adult Learners Online. Retrieved June 24, 2018, from http://www.iwt-alo.be/wp-content/uploads/2015/08/01-Project-report-Blended-learning-in-adult-education-towards-a-definition-of-blended-learning.pdf

Boelens, R., Voet, M., & De Wever, B. (2018). The design of blended learning in response to student diversity in higher education: Instructors' views and use of differentiated instruction in blended learning. *Computers & Education*, *120*, 197–212. https://doi.org/10.1016/j.compedu.2018.02.009

Boyatzis, R. E. (1998). *Transforming qualitative information: Thematic analysis and code development*. Thousand Oaks, CA: Sage.

Bradford, P., Porciello, M., Balkon, N., & Backus, D. (2007). The Blackboard learning system: The be all and end all in educational instruction? *The Journal of Educational Technology Systems*, *35*(3), 301–314.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Braun, V., & Clarke, V. (2012). Thematic analysis. In H. Cooper, P. M. Camic, D. L. Long, A. T. Panter, D. Rindskopf, & K. J. Sher (Eds.), *APA handbook of research methods in psychology, Vol 2: Research designs: Quantitative, qualitative, neuropsychological, and biological.* (pp. 57–71).

Washington, DC: American Psychological Association. https://doi.org/10.1037/13620-004

Bretthauer, D. (2001). Open source software: A history. *Information Technology and Libraries*, *21*(1).

British Council (n.d.). *Consolidation*. TeachingEnglish. Retrieved December 27, 2019, from https://www.teachingenglish.org.uk/article/consolidation

Brown, R. (2003). Blending learning: Rich experiences from a rich picture. *Training and Development in Australia*, *30*(3), 14–17.

Carpenter, C. R. (1950). *The classroom communicator (Rapid Mass Learning)*. Office of Naval Research - Special Devices Center. Retrieved January 23, 2019, from https://files.eric.ed.gov/fulltext/ED032755.pdf

Caudill, J. G. (2007). The growth of m-learning and the growth of mobile computing: parallel developments. *International Review of Research in Open and Distance Learning*, *8*(2).

CERN. (2020). *The birth of the Web.* CERN accelerating science. Retrieved November 19, 2018, from https://home.cern/science/computing/birth-web

Chen, W. (2009). A study of using blended learning in teaching and learning modern educational technology. In F. Wang, J. Fong, L. Zhang, & V. Lee (Eds.), *Hybrid learning and education - Lecture notes in computer science* (pp. 299–308). Berlin, Germany: Springer. https://doi.org/10.1007/978-3-642-03697-2_28

Chew, E., & Jones, N. (2009). The “e”-vangelist’s plan of action – Exemplars of the UK universities’ strategies for blended learning. In F. Wang, J. Fong, L. Zhang, & V. Lee (Eds.), *Hybrid learning and education - second international conference, ICHL 2009* (pp. 378–389). Berlin, Germany: Springer. https://doi.org/10.1007/978-3-642-03697-2_35

Cilliers, E. J. (2017). The challenge of teaching generation Z. *PEOPLE: International Journal of Social Sciences*, *3*(1), 188–198. https://doi.org/10.20319/pijss.2017.31.188198

Clark, J. (2001). Stimulating collaboration and discussion in online learning environments. *Internet and Higher Education*, *4*, 119–124. https://doi.org/10.1016/S1096-7516(01)00054-9

Clark, R. C., & Mayer, R. E. (2011). *E-learning and the science of instruction: Proven guidelines for consumers and designers of multimedia learning* (3rd ed.). San Francisco, CA: Pfeiffer.

CNED. (n.d.). *L’histoire du Cned depuis 1939*. Retrieved July 1, 2018, from http://www.cned.fr/media/20658/cnedhistoire1.pdf

Cohen, L., Manion, L., & Morrison, K. (2018). *Research methods in education* (8th ed.). New York, NY: Routledge Taylor & Francis Group.

Collins, A., Brown, J. S., & Newman, S. E. (1989). Cognitive apprenticeship: Teaching the craft of reading, writing, and mathematics. In L. B. Resnick (Ed.), *Knowing, learning, and instruction: Essays in honor of Robert Glaser* (pp. 453–494). Hillsdale, NJ: Lawrence Erlbaum Associates.

Collins, R. A., & Zacharakis, J. (2009). Impact of e-learning on adult education: A changing postmodern approach. In V. X. Wang (Ed.), *Handbook of research on e-learning applications for career and technical education: Technologies for vocational training* (pp. 286–296). Hershey, PA: IGI Global. https://doi.org/10.4018/978-1-60566-830-7.ch021

Conrad, D. (2002). Deep in the hearts of learners: Insights into the nature of online community. *Journal of Distance Education*, *17*(1), 1–19.

Craig, A. B. (2013). *Understanding augmented reality: Concepts and applications*. Amsterdam: Morgan Kaufmann. https://doi.org/10.1016/C2011-0-07249-6

Crompton, H. (2013). A historical overview of mobile learning: Toward learner-centered education. In Z. L. Berge & L. Y. Muilenburg (Eds.), *Handbook of mobile education* (pp. 80–107). Florence, SC: Routledge.

Cuban, L. (2001). *Oversold and underused: Computers in the classroom*. Cambridge, MA: Harvard University Press.

Daniel, J. S. (2012). Making sense of MOOCs: Musings in a maze of myth, paradox and possibility. *Journal of Interactive Media in Education*, *18*, 1–20. https://doi.org/10.5334/2012-18

Davies, A. (1993). Speculation and empiricism in applied linguistics. *Edinburgh Working Papers in Applied Linguistics*, *4*, 14–25.

De Gloria, A., Bellotti, F., & Berta, R. (2014). Serious games for education and training. *International Journal of Serious Games*, *1*(1). https://doi.org/10.17083/ijsg.v1i1.11

Dean, P., Stahl, M., Sylwester, D., & Peat, J. (2001). Effectiveness of combined delivery modalities for distance learning and resident learning. *Quarterly Review of Distance Education*, (July/August).

Dellos, R. (2015). Kahoot! A digital game resource for learning. *International Journal of Instructional Technology and Distance Learning*, *12*(4), 53–56.

Dennen, V. P. (2004). Cognitive apprenticeship in educational practice: Research on scaffolding, modeling, mentoring, and coaching as instructional strategies. In D. H. Jonassen (Ed.), *Handbook of research*

on educational communications and technology (2nd ed., pp. 813–828). Mahwah, NJ: Lawrence Erlbaum Associates.

Dettori, G., & Lupi, V. (2009). Using a narrative blog to support reflection in a blended course. In F. Wang, J. Fong, L. Zhang, & V. Lee (Eds.), *Hybrid Learning and education - lecture notes in computer science* (pp. 272–283). Berlin, Germany: Springer. https://doi.org/10.1007/978-3-642-03697-2_26

Dillon, A., & Gabbard, R. (1998). Hypermedia as an educational technology: A review of the quantitative research literature on learner comprehension, control, and style. *Review of Educational Research*, (68), 322–349.

Dirckinck-Holmfeld, L., Jones, C., & Lindström, B. (2009). *Analysing networked learning practices in higher education and continuing professional development*. Rotterdam, The Netherlands: Sense.

Donovan, M. S., Bransford, J. D., & Pellegrino, J. W. (1999). *How people learn: Bridging research and practice*. Washington, DC: National Academy of Sciences. https://doi.org/10.17226/9457

Driscoll, M. (2002, March). *Blended learning: Let's get beyond the hype*. E-Learning Magazine. Retrieved December 10, 2017, from http://www-07.ibm.com/services/pdf/blended_learning.pdf

Dutton, W. H., & Loader, B. D. (Eds.). (2005). *Digital academe: The new media and institutions of higher education and learning.* London: Routledge.

Dziuban, C. D., Graham, C. R., Moskal, P. D., Norberg, A., & Sicilia, N. (2018). Blended learning: The new normal and emerging technologies. *International Journal of Educational Technology in Higher Education*, *15*(3). https://doi.org/10.1186/s41239-017-0087-5

Dziuban, C. D., Hartman, J. L., & Moskal, P. D. (2004). *Blended learning*. Boulder, CO: EDUCAUSE.

Eisenhardt, K. M. (1989). Building theories from case study research. *The Academy of Management Review*, *14*(4), 532–550.

Ellis, R. A., Ginns, P., & Piggott, L. (2009). Higher education research & development e-learning in higher education: Some key aspects and their relationship to approaches to study. *Higher Education Research & Development*, *28*(3), 303–318. https://doi.org/10.1080/07294360902839909

Facebook. (n.d.). *About*. Retrieved July 9 2017, from https://www.facebook.com/pg/facebook/about/.

Ferster, B. (2014). *Teaching Machines: Learning from the intersection of education and technology*. Baltimore, MA: Johns Hopkins University Press.

Firmin, M. W., & Genesi, D. J. (2013). History and implementation of classroom technology. *Procedia - Social and Behavioral Sciences*, *93*, 1603–1617. https://doi.org/10.1016/j.sbspro.2013.10.089

Friesen, N. (2009). *Re-thinking e-learning research: Foundations, methods, and practices*. New York, NY: Peter Lang.

Gaebel, M., Kupriyanova, V., Morais, R., & Colucci, E. (2014, November, 14). *E-learning in European higher education institutions*. European University Association. Retrieved November 8, 2017, from https://www.eua.eu/resources/publications/368:e-learning-in-european-higher-education-institutions.html

Garrison, D. R. (1997). Computer conferencing: The post-industrial age of distance education. *Open Learning*, *12*(2), 3–11. https://doi.org/10.1080/0268051970120202

Garrison, D. R. (2003). Cognitive presence for effective asynchronous online learning: The role of reflective inquiry, self-direction and metacognition. In J. Bourne & J. C. Moore (Eds.), *Elements of quality online education: Practice and direction* (pp. 47–58). Needham, MA: Sloan-C.

Garrison, D. R. (2011). *E-learning in the 21st century: A framework for research and practice* (2nd ed.). London: Routledge/Falmer.

Garrison, D. R., & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *The Internet and Higher Education*, *7*(2), 95–105. https://doi.org/10.1016/j.iheduc.2004.02.001

Garrison, D. R., & Shale, D. (1987). Mapping the boundaries of distance education: Problems in defining the field. *American Journal of Distance Education*, *1*(1), 7–13. https://doi.org/10.1080/08923648709526567

Garrison, D. R., & Vaughan, N. D. (2008). *Blended learning in higher education: Framework, principles and guidelines*. San Fransisco, CA: Jossey-Bass.

Gemin, B., & Pape, L. (2017). *Keeping pace with K-12 online learning 2016*. Durango, CO: Evergreen Education Group.

Goodman, J. (1995). Change without difference: School restructuring in historical perspective. *Harvard Educational Review*, *65*(1), 1–30.

Goodyear, P., Jones, C., Asensio, M., Hodgson, V., & Steeples, C. (2005). Networked learning in higher education: Students' expectations and

experiences. *Higher Education*, (50), 473–508. https://doi.org/10.1007/s10734-004-6364-y

Graham, C. R. (2006). Blended learning systems - definition, current trends, and future directions. In C.J. Bonk & C. R. Graham (Eds.), *The handbook of blended learning* (pp. 3–21). San Fransisco, CA: Pfeiffer.

Graham, C. R. (2013). Emerging practice and research in blended learning. In M. G. Moore (Ed.), *Handbook of distance education* (3rd ed., pp. 333–350). https://doi.org/10.4324/9780203803738.ch21

Graham, C. R., Allen, S., & Ure, D. (2005). Benefits and challenges of blended learning environments. In M. Khosrow-Pour (Ed.), *Encyclopedia of information science and technology* (pp. 253–259). Hershey, PA: IGI Global. https://doi.org/10.4018/978-1-59140-553-5.ch047

Graham, C. R., Woodfield, W., & Buckley, H. J. (2013). A framework for institutional adoption and implementation of blended learning in higher education. *Internet and Higher Education*, *18*, 4–14. https://doi.org/10.1016/j.iheduc.2012.09.003

Greener, S. L. (2008). Self - aware and self - directed: Student conceptions of blended learning. *Journal of Online Learning and Teaching*, *4*(2), 243–253.

Gregersen, E. (2017). Wi-Fi. In *Encyclopædia Britannica*.Britannica Group. Retrieved November 20, 2017, from https://www.britannica.com/technology/Wi-Fi

Gregg, K. R. (1993). Taking explanation seriously; or, let a couple of flowers bloom. *Applied Linguistics*, *14*(3), 276–294.

Guri-Rosenblit, S. (2005). “Distance education” and “e-learning”: Not the same thing. *Higher Education*, *49*, 467–493. https://doi.org/10.1007/s10734-004-0040-0

Harasim, L. (Ed.). (1990). *Online education: Perspectives on a new medium.* New York, NY: Prager/Greenwood.

Harasim, L. (2000). Shift happens: Online education as a new paradigm in learning. *Internet and Higher Education*, *3*(1–2), 41–61. https://doi.org/10.1016/S1096-7516(00)00032-4

Harasim, L. (2006). A history of e-learning: Shift happened. In J. Weiss (Ed.), *The international handbook of virtual learning environments* (pp. 59–94). Dordrecht, The Netherlands: Springer. https://doi.org/10.1007/978-1-4020-3803-7_2

Harding, A., Kaczynski, D., & Wood, L. (2005). Evaluation of blended learning:

Analysis of qualitative data. *UniServe Science Blended Learning Symposium Proceedings*, 56–62.

Hardy, I. R. (1996). *The evolution of ARPANET email* (University of California at Berkeley). Berkeley, CA: University of California.

Hartman, J. L., Dziuban, C. D., & Moskal, P. D. (2000). Faculty satisfaction in ALNs: A dependent or independent variable? In J. Bourne (Ed.), *Online education: Learning effectiveness and faculty satisfaction* (pp. 155–177). Nashville, TN: ALN Center.

Hattie, J. A. C., & Donoghue, G. M. (2016). Learning strategies: A synthesis and conceptual model. *NPJ Science of Learning*, *1*(16013), 1–13. https://doi.org/10.1038/npjscilearn.2016.13

HEFCE. (2009). *HEFCE strategy for e-learning*. Bristol: HEFCE.

Hiltz, S. R., & Turoff, M. (2005). Education goes digital: The evolution of online learning and the revolution in higher education. *Communications of the ACM*, *48*(10), 59–64.

Hitchcock, G., & Hughes, D. (1995). Research and the teacher. London: Routledge.

Hodkinson, P., & Hodkinson, H. (2001). The strengths and limitations of case study research. Cambridge: Learning and Skills Development Agency.

Hoffmann, J. (2006). Why blended learning hasn't (yet) fulfilled its promises: Answers to those questions that keep you up at night. In C. J. Bonk & C. R. Graham (Eds.), *Handbook of blended learning: Global perspectives, local designs*. San Francisco, CA: Pfeiffer.

Howard, S. K., & Mozejko, A. (2015). Considering the history of digital technologies in education. In M. Henderson & G. Romero (Ed.), *Teaching and digital technologies: Big issues and critical questions* (pp. 157–168). Port Melbourne, VIC: Cambridge University Press.

Huang, R., & Zheng, L. (2009). An empirical study on blended learning in the introduction to educational technology course. In F. Wang, J. Fong, L. Zhang, & V. Lee (Eds.), *Hybrid learning and education - Lecture notes in computer science* (pp. 122–132). Berlin, Germany: Springer. https://doi.org/10.1007/978-3-642-03697-2_12

IBM. (n.d.). *DPD chronology - page 3*. Retrieved July 1, 2018, from https://www-03.ibm.com/ibm/history/exhibits/dpd50/dpd50_chronology3.html

Islam, N., & Want, R. (2014). Smartphones: Past, present, and future. *IEEE Pervasive Computing, 13*(4), 89–92.

https://doi.org/10.1109/MPRV.2014.74

ISTE. (n.d.). *ISTE story.* Retrieved October 1, 2018, from https://www.iste.org/about/iste-story

ITEEA. (n.d.). *A brief history of ITEEA*. Retrieved July 1, 2018, from https://www.iteea.org/About/History.aspx

Januszewski, A., & Molenda, M. (Eds.). (2008). Educational technology: A definition with commentary. New York, NY: Routledge Taylor & Francis Group.

Jonassen, D. H. (1991). Objectivism vs.constructivism: Do we need a new philosophical paradigm? *Educational Technology: Research and Development*, *39*(3), 5–14.

Kanuka, H. (2002). A Principled approach to facilitating distance education: The Internet, higher education and higher levels of learning. *Journal of Distance Education*, *17*(2), 70–86.

Kauffman, G. B. (1990). The art and science of lecture demonstration. *Journal of Chemical Education*, *67*(2), A55. https://doi.org/10.1021/ed067pA55.3

Kaveh, Z. (2012). Integration and impact of educational media (technologies) in the teaching-learning process: A case study in Iran. *Middle East Journal of Family Medicine*, *10*(7), 30–38.

Kay, A. (1972). A personal computer for children of all ages. In J. Donovan & R. Shields (Eds.), *Proceedings of the ACM annual conference*. New York, NY: ACM. https://doi.org/https://doi.org/10.1145/800193.1971922

Keegan, D. (1980). On defining distance education. *Distance Education*, *1*(1), 13–36.

Kelly, M., Lyng, C., Mcgrath, M., & Cannon, G. (2009). A multi-method study to determine the effectiveness of, and student attitudes to, online instructional videos for teaching clinical nursing skills. *Nurse Education Today*, 29, 292–300. https://doi.org/10.1016/j.nedt.2008.09.004

Kho, A., Henderson, L. E., Dressler, D. D., & Kripalani, S. (2006). Use of handheld computers in medical education. *Journal of General Internal Medicine, 21*(5), 531–537. https://doi.org/10.1111/j.1525-1497.2006.00444.x

Kim, K.-J., Bonk, C. J., & Teng, Y.-T. (2009). The present state and future trends of blended learning in workplace learning settings across five countries. *Asia Pacific Education Review, 10*(3), 299–308. https://doi.org/10.1007/s12564-009-9031-2

Kirkwood, A., & Price, L. (2013). Technology-enhanced learning and teaching in higher education: What is “enhanced” and how do we know? A critical literature review. *Learning, Media and Technology, 39*(1), 6–36. https://doi.org/10.1080/17439884.2013.770404

Koohang, A., & Harman, K. (2005). Open source: A metaphor for e-learning. *Informing Science Journal*, 8, 75–86.

Kvale, S. (2006). Dominance through interviews and dialogues. *Qualitative Inquiry, 12*(3), 480–500. https://doi.org/10.1177/1077800406286235

Laouris, Y., & Eteokleous, N. (2005). We need an educationally relevant definition of mobile learning. In H. J. Van der Merwe & T. H. Brown (Eds.), *Mobile technology: The future of learning in your hands, mLearn 2005 book of abstracts*. Cape Town, South Africa: mLearn 2005.

Laurillard, D. (2002). *Re-thinking university teaching: A conversational framework for the effective use of educational technology*. London: RoutledgeFalmer.

Lave, J., & Wenger, E. (1991). *Communities of practice: Creating learning environments for educators*. Cambridge: Cambridge University Press.

Lepper, M. R., & Woolverton, M. (2002). The wisdom of practice: Lessons learned from the study of highly effective tutors improving academic achievement. In J. Aronson (Ed.), *Improving academic achievement: Impact of psychological factors on education* (pp. 135–158). New York, NY: Elsevier. https://doi.org/https://doi.org/10.1016/B978-012064455-1/50010-5

Leuf, B., & Cunningham, W. (2001). *The wiki way: Collaboration and sharing on the Internet*. Boston, MA: Addison-Wesley Professional.

Li, F. W. B., Lau, R. W. H., & Dharmendran, P. (2009). A three-tier profiling framework for adaptive e-learning. In M. Spaniol, Q. Li, R. Klamma, & R. W. H. Lau (Eds.), *Advances in web based learning - ICWL 2009* (pp. 235–244). Berlin, Germany: Springer.

Liaw, S.-S. (2008). Investigating students’ perceived satisfaction, behavioral intention, and effectiveness of e-learning: A case study of the Blackboard system. *Computers & Education*, *51*(2), 864–873. https://doi.org/10.1016/j.compedu.2007.09.005

Logo Foundation. (2015). *Logo history*. Retrieved November 17, 2018, from http://el.media.mit.edu/logo-foundation/what_is_logo/history.html

Lopez-Perez, M. V., Perez-Lopez, M. C., & Rodriguez-Ariza, L. (2011). Blended learning in higher education: Students’ perceptions and their relation to outcomes. *Computers & Education*, *56*(3), 818–826.

https://doi.org/10.1016/j.compedu.2010.10.023

Ma, D., & Zheng, L. (2009). Research into the status quo of learning strategies of college students and blended learning strategy. In F. Wang, J. Fong, L. Zhang, & V. Lee (Eds.), *Hybrid learning and education - lecture notes in computer science* (pp. 175–185). Berlin, Germany: Springer. https://doi.org/10.1007/978-3-642-03697-2_17

Maina, F. W. (2004). Authentic learning: Perspectives from contemporary educators. *Journal of Authentic Learning*, *1*(1), 1–8.

Marshall, S. (2011, February 3). More face-to-face, less face-to-screen. *The Chronicle of Higher Education*. Retrieved from http://chronicle.com/article/More-Face-to-Face-Less/126163/

Martínez-Caro, E., & Campuzano-Bolarín, F. (2011). Factors affecting students' satisfaction in engineering disciplines: Traditional vs. blended approaches. *European Journal of Engineering Education, 36*(5), 473–483. https://doi.org/10.1080/03043797.2011.619647

Masie, E. (2002). Blended learning: The magic is in the mix. In A. Rosset (Ed.), *The ASTD e-learning handbook* (pp. 58–63). New York, NY: Mc Graw-Hill.

Masie, E. (2006). The Blended learning imperative. In C. J. Bonk & C. R. Graham (Eds.), *The Handbook of blended learning: Global perspectives, local designs* (pp. 22–26). San Francisco, CA: Pfeiffer.

Mason, R., & Rennie, F. (2006). Elearning: The key concepts. In *Elearning: The key concepts* (Vol. 39). New York, NY: Routledge Key Guides.

Massy, J. (2006). The integration of learning technologies into Europe's education and training systems. In C. J. Bonk & C. R. Graham (Eds.), *The handbook of blended learning: Global perspectives, local designs* (pp. 419–431). San Francisco, CA: Pfeiffer.

McAuley, A., Stewart, B., Siemens, G., & Cormier, D. (2010). *The MOOC model for digital practice: Digital ways of knowing and learning*. Charlottetown: University of Prince Edward Island.

McDonald, P. L. (2012). *Adult learners and blended learning: A phenomenographic study of variation in adult learners' experiences of blended learning in higher education* [Doctoral dissertation, George Washington University]. Retrieved from ProQuest. (3502645)

McGovern, N., & Barnes, K. (2009). Lectures from my living room: A pilot study of hybrid learning from the students' perspective. In F. Wang, J. Fong, L. Zhang, & V. Lee (Eds.), *Hybrid learning and education - Lecture notes in computer science* (pp. 284–298). Berlin, Germany: Springer.

https://doi.org/10.1007/978-3-642-03697-2_27

McGraw-Hill. (n.d.). *SIMnet*. Retrieved November 17, 2018, from https://www.mheducation.com/highered/simnet.html

McLeod, J. (2008). *Counselling in the workplace: A comprehensive review of the research evidence* (2nd ed.). Lutterworth: British Association for Counselling & Psychotherapy.

Means, B., Toyama, Y., Murphy, R., Bakia, M., & Jones, K. (2009). *Evaluation of evidence-based practices in online learning: A meta-analysis and review of online learning studies*. Washington, DC: US Department of Education.

Merriam, S. B. (1998). Case studies as qualitative research. In *Qualitative research and case study applications in education* (2nd ed., pp. 26–43). San Fransisco, CA: Jossey-Bass.

Merriam, S. B. (2009). *Qualitative research: A guide to design and implementation*. San Francisco, CA: Jossey-Bass.

Merriam-Webster. (n.d.). Consolidation. In *Merriam-Webster.com dictionary*. Retrieved December 27, 2019, from https://www.merriam-webster.com/dictionary/consolidation#learn-more

Metiri Group. (2006). *Technology in schools: What the research says*. Marina Del Ray, CA: Cisco Systems, Inc.

Meyer, K. A. (2003). Face-to-face versus threaded discussions: The role of time and higher-order thinking. *Journal of Asynchronous Learning Networks, 7*(3), 55–65.

Mezirow, J. (2003). Transformative learning as discourse. *Journal of Transformative Education, 1*(1), 58–63. https://doi.org/10.1177/1541344603252172

MIT. (2018). *About OCW*. Retrieved July 5, 2018, from MIT OpenCourseWare website: https://ocw.mit.edu/about/

Molinari, D. L. (2004). The role of social comments in problem-solving groups in an online class. *The American Journal of Distance Education, 18*(2), 89–101. https://doi.org/10.1207/s15389286ajde1802_3

Moodle (2018, November 21). *History*. Retrieved November 24, 2018, from https://docs.moodle.org/35/en/History

Moore, J. L., Dickson-Deane, C., & Galyen, K. (2011). E-Learning, online learning, and distance learning environments: Are they the same? *Internet and Higher Education, 14*(2), 129–135.

https://doi.org/10.1016/j.iheduc.2010.10.001

Moore, M. G. (1990). Background and overview of contemporary American distance education. In M. G. Moore (Ed.), *Contemporary issues in American distance education* (pp. xii–xxvi). New York, NY: Pergamon Press.

Moore, M. G., & Kearsley, G. (2005). *Distance education: A system's view* (2nd ed.). Belmont, CA: Wadsworth.

Morgan, D. L. (1997). *Focus groups as qualitative research (Qualitative research methods)*. Thousand Oaks, CA: Sage. https://doi.org/10.4135/9781412984287

Morgan, D. L. (2014). Pragmatism as a paradigm for social research. *Qualitative inquiry, 20*(8), 1045–1053. https://doi.org/10.1177/1077800413513733

Morrill, C. S. (1961). Teaching machines: A review. *Psychological Bulletin, 58*(5), 363–375. https://doi.org/10.1037/h0047318

Moskal, P., Dziuban, C. D., & Hartman, J. L. (2013). Blended learning: A dangerous idea? *Internet and Higher Education*, *18*, 15–23. https://doi.org/10.1016/j.iheduc.2012.12.001

Muller, S. et al. (1984). Physicians for the twenty-first century: Report of the project panel on the general professional education of the physician and college preparation for medicine. *Journal of Medical Education, 59*(11), 1–208.

NASA. (2007). *Sputnik*. Retrieved August 13, 2018, from https://history.nasa.gov/sputnik/

Nazarenko, A. L. (2015). Blended learning vs traditional learning: What works? (A case study research). *Procedia - Social and Behavioral Sciences, 200*(October), 77–82. https://doi.org/10.1016/j.sbspro.2015.08.018

Neville, A. J. (1999). The problem-based learning tutor: Teacher? Facilitator? Evaluator? *Medical Teacher, 21*(4), 393–401. https://doi.org/10.1080/01421599979338

NMC. (n.d.). *Horizon Project History*. Retrieved November 23, 2018, from https://www.nmc.org/nmc-horizon/nmc-horizon-project-history/

Norberg, A., Dziuban, C. D., & Moskal, P. D. (2011). A time-based blended learning model. *On the Horizon, 19*(3), 207–216. https://doi.org/10.1108/10748121111163913

Norris, S. P., Guilbert, S. M., Smith, M. L., Hakimelahi, S., & Phillips, L. M. (2005). A theoretical framework for narrative explanation in science. *Science Education, 89*(4), 535–563. https://doi.org/10.1002/sce.20063

O'Brien, T. (1991). The science and art of science demonstrations. Journal of Chemical Education, 68(11), 933–936.

O'Neill, M. E. (2005). Automated Use of a Wiki for Collaborative Lecture Notes. *ACM SIGSCE Bulletin, 37*(1), 267–271.

O'Reilly, T., & Battelle, J. (2009). Web squared: Web 2.0 five years on. In *Web 2.0 Summit 2009*. Sebastopol, CA: O' Reilly Media Inc.

Ocak, M. A. (2011). Why are faculty members not teaching blended courses? Insights from faculty members. *Computers & Education, 56*(3), 689–699. https://doi.org/10.1016/j.compedu.2010.10.011

Oliver, M., & Trigwell, K. (2005). Can "blended learning" be redeemed? *E-Learning, 2*(1), 17–26. https://doi.org/10.2304/elea.2005.2.1.2

Online Learning Consortium. (2018). *Our history - OLC*. Retrieved November 19, 2018, from https://onlinelearningconsortium.org/about/history/

Open Source Initiative (2018, October). *History of the OSI.* Retrieved November 9, 2019, from https://opensource.org/history

Osguthorpe, R. T., & Graham, C. R. (2003). Blended learning environments. definitions and directions. *The Quarterly Review of Distance Education, 4*(3), 227–233.

Oxagile. (2018). *History and trends of learning management system [Infographic]*. Retrieved November 24, 2018, from https://www.oxagile.com/company/blog/history-and-trends-of-learning-management-system-infographics/

P21. (n.d.). *Our history - P21*. Retrieved November 23, 2018, from http://www.p21.org/about-us/our-history

PACFA. (2013). *Definition of Counselling*. PACFA - Psychotherapy and Counselling Federation of Australia. Retrieved December 19, 2019, from https://www.pacfa.org.au/definition-of-counselling/

Papert, S. (1980). *Mindstorms: Children, computers, and powerful ideas*. New York, NY: Basic Books,.

Parchoma, G. (2011). Toward diversity in researching teaching and technology philosophies-in-practice in e-learning communities. In B. K. Daniel (Ed.), *Handbook of research on methods and techniques for studying virtual communities* (pp. 61–86). Hershey, PA: IGI Global.

https://doi.org/10.4018/978-1-60960-040-2.ch004

Parisi, L. (2012). Speculation: A method for the unattainable. In C. Lury & N. Wakeford (Eds.), *Inventive methods: The happening of the social* (pp. 232–244). Oxford: Routledge.

Passey, D. (2014). *Inclusive technology enhanced learning: Overcoming cognitive, physical, emotional & geographic challenges*. London: Routledge.

Passey, D. (2017). New ways of learning using different forms of technologies. In J. A. H. Moral (Ed.), *Retos y debates en la educación superior para el siglo XXI* (pp. 15–22). Xalapa, Mexico: Universidad Veracruzana.

Passey, D. (2019). Blending learning provision for higher education: integrating 'new ways' of teaching and learning. In A. Tatnall (Ed.), *Encyclopedia of Information and Communication Technologies*. Cham, Switzerland: Springer. https://doi.org/10.1007/978-3-319-60013-0_258-1

Patton, M. Q. (2002). Qualitative research & evaluation methods. In *Qualitative inquiry (3rd ed.).* Thousand Oaks, CA: Sage.

Phipps, R., & Merisotis, J. (1999). *What's the difference? A review of contemporary research on the effectiveness of distance learning in higher education*. Washington, DC: The Institute for Higher Education Policy.

Picciano, A. G. (2009). Blending with purpose: The multimodal model. *Journal of Asynchronous Learning Networks, 13*(1), 7–18.

Pistrang, N., & Barker, C. (2012). Varieties of qualitative research: A pragmatic approach to selecting methods. In H. Cooper, P. M. Camic, D. L. Long, A. T. Panter, D. Rindskopf, & K. J. Sher (Eds.), *APA handbook of research methods in psychology*, Vol 2: Research designs: Quantitative, qualitative, neuropsychological, and biological. (Vol. 2, pp. 5–18). Washington, DC: American Psychological Association. https://doi.org/10.1037/13620-001

Preville, P. (2018, October 16). *How to teach Generation Z in the classroom.* Retrieved December 14, 2019, from https://tophat.com/blog/generation-z-teach-classroom/

Quinn, C. (2000). *mLearning: Mobile, wireless, in-your-pocket learning*. Vienna, VA: Linezine.

Reigeluth, C. M., & Carr-Chellman, A. A.(Eds.) (2009). *Instructional-design theories and models*. New York, NY: Taylor & Francis.

Rhode, J. F. (2009). International review of research in open and distance

learning. *The International Review of Research in Open and Distributed Learning, 10*(1), 23.

Roblyer, M. D. (2016). *Educational technology in context: The big picture. Integrating educational technology into teaching*. Boston, MA: Pearson.

Rogers, C. R. (1968). *The interpersonal relationship in the facilitation of learning.* Columbus, OH: C. E. Merrill Pub.

Ross, B., & Gage, K. (2006). Global perspectives on blended learning: Insight from WebCT and our customers in higher education. In C. J. Bonk & C. R. Graham (Eds.), *The handbook of blended learning: Global perspectives, local designs* (pp. 155–168). San Francisco, CA: Pfeiffer.

Ross, J. (2017). Speculative method in digital education research Speculative method in digital education research. *Learning, Media and Technology, 42*(2), 214–229. https://doi.org/10.1080/17439884.2016.1160927

Rossiter, D. (2007). Whither e-learning? Conceptions of change and innovation in higher education. *Journal of Organisational Transformation and Social Change, 4*(1), 93–107.

Rovai, A. P., & Jordan, H. M. (2004). Blended learning and sense of community: A comparative analysis with traditional and fully online graduate courses. *International Review of Research in Open and Distance Learning, 5*(2), 20-33.

Ruiz, N. , & Fandos, M. (2014). The role of tutoring in higher education: Improving the students' academic success and professional goals. *Revista Internacional de Organizaciones*, 12, 89–100. https://doi.org/10.17345/rio12.89-100

Rule, A. (2006). The components of authentic learning. *Journal of Authentic Learning, 3*(1), 1–10.

Ruth, A., & Houghton, L. (2009). The wiki way of learning. *Australasian Journal of Educational Technology, 25*(2), 135–152.

Rutten, N., Van Joolingen, W. R., & Van Der Veen, J. T. (2012). The learning effects of computer simulations in science education. *Computers and Education, 58*(1), 136–153. https://doi.org/10.1016/j.compedu.2011.07.017

Saettler, P. (2004). *The evolution of american educational technology* (2nd ed.). Greenwich, NY: Information Age Publishing, Inc.

Sandeen, C. (2013). Integrating MOOCS into traditional higher education: The emerging "MOOC 3.0" era. *Change: The Magazine of Higher Learning, 45*(6), 34–39. https://doi.org/10.1080/00091383.2013.842103

Sandholtz, J. H., Ringstaff, C., & Dwyer, D. D. (1997). *Teaching with technology: Creating student-centered classrooms*. New York, NY: Teachers College Press.

Sangrà, A., Vlachopoulos, D., & Cabrera, N. (2012). Building an inclusive definition of e-learning: An approach to the conceptual framework. *The International Review of Research in Open and Distance Learning, 13*(2), 145–159.

Savill-Smith, C., & Kent, P. (2003). *The use of palmtop computers for learning. A review of the literature*. London: Learning and Skills Development Agency.

Seels, B. B., & Richey, R. C. (Eds.). (1994). *Instructional technology: The definition and domains of the field*. Bloomington, IN: Association for Educational Communication and Technology.

Selwyn, N. (2011). *Education and technology: Key issues and debates*. New York, NY: Continuum Books.

Sharma, S. K., & Kitchens, F. L. (2004). Web services architecture for m-learning. *Electronic Journal on e-Learning, 2*(1), 203–213.

Sharpe, R., & Benfield, G. (2005). The student experience of e-learning in higher education: A review of the literature. *Brookes EJournal of Learning and Teaching, 3*(1), 1-9.

Sharples, M., Taylor, J., & Vavoula, G. (2006). A theory of learning for the mobile age. In R. Andrews & C. Haythornthwaite (Eds.), *The Sage handbook of elearning research* (pp. 221–247). Thousand Oaks, CA: Sage.

Singh, H. (2003). Building effective blended learning programs. *Educational Technology, 43*(6), 51–54.

Singh, H., & Reed, C. (2001). *A white paper: Achieving success with blended learning* (pp. 1–11). Los Angeles, CA: Centra Software.

SMART Technologies. (2018). *About us.* Retrieved November 19, 2018, from https://home.smarttech.com/about-us

Smith, F. J. (1913). The evolution of motion picture. *The New York Dramatic Mirror*, July 9. 24, 42.

So, H.-J., & Brush, T. A. (2008). Student perceptions of collaborative learning, social presence and satisfaction in a blended learning environment: Relationships and critical factors. *Computers & Education, 51*(1), 318–336. https://doi.org/10.1016/j.compedu.2007.05.009

Solimeno, A., Mebane, M. E., Tomai, M., & Francescato, D. (2008). The influence of students and teachers characteristics on the efficacy of face-to-face and computer supported collaborative learning. *Computers & Education, 51*(1), 109–128. https://doi.org/10.1016/j.compedu.2007.04.003

Soloway, E., Guzdial, M., & Hay, K. E. (1994). Learner-Centered Design: The challenge for HCI in the 21st century. *Interactions, 1*(2), 36–48. https://doi.org/10.1145/174809.174813

Soukup, P. (2014). Looking at, with and through YouTube. *Communication Research Trends, 33*(3), 3–34.

Spanjers, I. A. E., Könings, K. D., Leppink, J., Verstegen, D. M. L., De Jong, N., Czabanowska, K., & Van Merriënboer, J. J. G. (2015). The promised land of blended learning: Quizzes as a moderator. *Educational Research Review*, *(15)*, 59–74. https://doi.org/10.1016/j.edurev.2015.05.001

Stacey, E., & Gerbic, P. (2008). Success factors for blended learning. In R. Atkinson & C. McBeath (Eds.), *Proceedings of the ASCILITE Conference Melbourne 2008*, (pp. 964–968). Melbourne: ASCILITE.

Stahl, G., & Hesse, F. (2006). ijCSCL-a journal for research in CSCL. *Computer-Supported Collaborative Learning, 1*, 3–7. https://doi.org/10.1007/s11412-006-7867-6

Stahl, G., Koschmann, T., & Suthers, D. (2006). Computer-supported collaborative learning: An historical perspective. In R. K. Sawyer (Ed.), *Cambridge handbook of the learning sciences* (pp. 409–426). Cambridge: Cambridge University Press.

Stake, R. (2005). Qualitative case studies. In N. Denzin & Y. Lincoln (Eds.), *The SAGE handbook of qualitative research* (pp. 443–466). Thousand Oaks, CA: Sage.

Stake, R. (2014). *Qualitative research: Studying how things work*. New York, NY: Guilford.

Staker, H. C., & Horn, M. B. (2012). *Classifying K-12 blended learning*. Lexington, KY: Innosight Institute.

Stefanou, V. (2013). What is considered “blended learning” in higher education? *International Journal of Knowledge Society Research, 4*(1), 108–116. https://doi.org/http://dx.doi.org/10.4018/jksr.2013010108

Stephen, J. E., Christie, G., Flood, K., Golant, M., Rahn, M., Rennie, H., Turner, J. (2011). Facilitating online support groups for cancer patients: The learning experience of psycho-oncology clinicians. *Psycho-oncology, 20*(8), 832–840. https://doi.org/10.1002/pon.1791

Stone, M. T., & Perumean-Chaney, S. (2011). The benefits of online teaching for traditional classroom pedagogy: A case study for improving face-to-face instruction. *MERLOT Journal of Online Learning and Teaching, 7*(3), 393–400.

Suleman, Q. (2011). Role of educational technology at primary school level in district Karak. *International Journal of Academic Research in Business and Social Sciences, 1*(3), 85–95.

Suppes, P. (1966). The uses of computers in education. *Scientific American, 215*(3), 206–223. https://doi.org/10.2307/24931056

Surber, A. M. (2016). *E-learning factors influencing strategies: Multi-case study of employee training at a higher educational institution*. [Doctoral dissertation, Northcentral University]. Retrieved from ProQuest. (10256272).

Swenson, M. (2010). The blended future of learning. In N. Paine & E. Masie (Eds.), *Learning perspectives 2010* (pp. 92–97). Saratoga Springs, NY: The MASIE Center & The Learning Consortium.

Tamim, R. M., Bernard, R. M., Borokhovski, E., Abrami, P. C., & Schmid, R. F. (2011). What forty years of research says about the impact of technology on learning: A second-order meta-analysis and validation study. *Review of Educational Research, 81*(1), 4–28. https://doi.org/10.3102/0034654310393361

Tatnall, A., & Davey, B. (2014). History of the use of computers and information technology in education in universities and schools in Victoria. In K. Kimppa, D. Whitehouse, T. Kuusela, & J. Phahlamohlaka (Eds.), *ICT and society*. *11th IFIP international conference on human choice and computers (HCC).* (pp. 214–225). Berlin, Germany: Springer. https://doi.org/10.1007/978-3-662-44208-1_18

Taylor, J. C. (1995). Distance education technologies: The fourth generation. *Australian Journal of Educational Technology, 11*(2), 1–7. https://doi.org/10.14742/ajet.2072

Taylor, J. C. (2001). *Fifth generation distance education*. Canberra, ACT: Department of education, training and youth affairs - Higher education division.

TED Conferences, L. (2018). *History of TED*. Retrieved July 5, 2018, from https://www.ted.com/about/our-organization/history-of-ted

Teng, Y.-T., Bonk, C. J., & Kim, K.-J. (2009). The trend of blended learning in Taiwan: Perceptions of HRD practitioners and implications for emerging competencies. *Human Resource Development International, 12*(1), 69–84. https://doi.org/10.1080/13678860802638842

Thai, N. T. T., De Wever, B., & Valcke, M. (2017). The impact of a flipped classroom design on learning performance in higher education: Looking for the best “blend” of lectures and guiding questions with feedback. *Computers & Education*, *107*, 113–126. https://doi.org/10.1016/j.compedu.2017.01.003

The teaching machines. (1960). *Time, 76*(19), 91-94.

Thorne, K. (2003). *Blended learning: How to integrate online & traditional learning*. London: Kogan Page.

Torrisi-Steele, G., & Drew, S. (2013). The literature landscape of blended learning in higher education: The need for better understanding of academic blended practice. *International Journal for Academic Development, 18*(4), 371–383. https://doi.org/10.1080/1360144X.2013.786720

Triacca, L., Bolchini, D., Botturi, L., & Inversini, A. (2004). MiLE: Systematic usability evaluation for e-learning web applications. In L. Cantoni & C. McLoughlin (Eds.), *Proceedings of ED-MEDIA 2004--World conference on educational multimedia, hypermedia & telecommunications* (pp. 4398-4405). Lugano, Switzerland: Association for the advancement of computing in education (AACE).

Triggs, R. (2018). *A quick history of bluetooth*. Retrieved November 30, 2019, from https://www.androidauthority.com/history-bluetooth-explained-846345/

Tuer, A. W. (1897). *History of the horn book*. London: The Leadenhall Press.

Twinkl (n.d.). *What is consolidate learning?* Retrieved December 27, 2019, from https://www.twinkl.com/teaching-wiki/consolidate-learning

UNESCO, CISCO, INTEL, ISTE, & Microsoft. (2011). *UNESCO ICT competency framework for teachers*. Paris, France: UNESCO.

Valiathan, P. (2002). Blended learning models. *Learning Circuits*, 50-59.

Vigdor, J. L., Ladd, H. F., & Martinez, E. (2014). Scaling the digital divide: Home computer technology and student achievement. *Economic Inquiry, 52*(3), 1103–1119. https://doi.org/10.1111/ecin.12089

Vignare, K. (2007). Review of literature, blended learning: Using ALN to change the classroom–will it work. In A. G. Picciano & C. D. Dziuban (Eds.), *Blended learning: Research perspectives* (pp. 37–63). Boston, MA: Sloan-C. https://doi.org/10.1080/10632910903458896

Voogt, J., & Knezek, G. A. (2008). *International handbook of information technology in primary and secondary education*. New York, NY: Springer.

Walker, R., Voce, J., & Ahmed, J. (2012). *2012 Survey of technology enhanced learning for higher education in the UK*. Oxford: UCISA.

Walker, R., Voce, J., Jenkins, M., Barrand, M., Hollinshead, L., Craik, A., Latif, F., Sherman, S., & Brown, V. (2018). *2018 Survey of technology enhanced learning for higher education in the UK*. Oxford: UCISA.

Wang, V. X. (2011). Online adult education: Policy, access, completion and equity. In V. X. Wang (Ed.), *Encyclopedia of information communication technologies and adult education integration* (pp. 506–520). Hershey, PA: IGI Global. https://doi.org/10.4018/978-1-61692-906-0.ch030

Warner, D. (2018). *Broadband history*. Retrieved November 30, 2019, from https://www.uswitch.com/broadband/guides/broadband_history/

Watson, J. (2005). *Keeping pace with K-12 online learning: A review of state-level policy and practice*. Naperville, IL: Learning Point Associates.

Watson, J., Gemin, B., & Ryan, J. (2008). *Keeping pace with k-12 online learning: A review of state-level policy and practice*. Durango, CO: Evergreen Education Group.

West, G. B. (1999). Teaching and technology in higher education: Changes and challenges. *Adult learning, 10*(4), 16–18. https://doi.org/10.1177/104515959901000406

Wheeler, S. (2001). Information and communication technologies and the changing role of the teacher. *Journal of Educational Media, 26*(1), 7–17.

Willett, H. G. (2002). Not one or the other but both: Hybrid course delivery using WebCT. *The Electronic Library, 20*(5), 413–419. https://doi.org/10.1108/02640470210447847

Wong, L., & Tatnall, A. (2009). The need to balance the blend: Online versus face-to-face teaching in an introductory accounting subject. *Issues in Informing Science and Information Technology, 6*, 309-322. https://doi.org/10.28945/1061

Wood, W. B., & Tanner, K. D. (2012). The role of the lecturer as tutor: Doing what effective tutors do in a large lecture class. *CBE - Life Sciences Education, 11*, 3–9. https://doi.org/10.1187/cbe.11-12-0110

Woodside, A., & Wilson, E. (2003). Case study research methods for theory building. *The Journal of Business & Industrial Marketing, 18*(6/7), 493–508. https://doi.org/10.1108/08858620310492374

Yang, Y.-T. C., Newby, T. J., & Bill, R. L. (2005). Using Socratic questioning to promote critical thinking skills through asynchronous discussion forums in distance learning environments. *The American Journal of Distance*

Education, 19(3), 163–181. https://doi.org/10.1207/s15389286ajde1903_4

Yen, J. C., & Lee, C. Y. (2011). Exploring problem solving patterns and their impact on learning achievement in a blended learning environment. *Computers and Education, 56*(1), 138–145. https://doi.org/10.1016/j.compedu.2010.08.012

Yin, R. K. (2009). *Case study research: Design and methods* (4th ed.). Thousand Oaks, CA: Sage.

Young, J. R. (2002, March 22). *"Hybrid" teaching seeks to end the divide between traditional and online instruction*. Chronicle of Higher Education. Retrieved November 9, 2018 from https://www.chronicle.com/article/Hybrid-Teaching-Seeks-to-End/18487.

Zhang, J., & Walls, R. (2006). Instructors' self-perceived pedagogical principle implementation in the online environment. *Quarterly Review of Distance Education, 7*(4), 413-426,449-450.

Appendix I Sample Transcriptions of Collected Data

Transcription Excerpt - Professor Interview

Interview with D.M – May 17, 2019, 11:30am, duration 35'

V: What do you think about a potential transition of the 'Introduction to Information Systems' to blended mode?

D: Well, I was one of the first who suggested this many many years ago. <laughs>, I am in favour, I think it is going to work great, it would help improve the student engagement with the course, and it will also assist the professors to assign homework, formative work which the students don't usually do if not for a grade or a penalty.

V: so they will have the incentive of completing the formative assignments because they will have the penalty of the absence?

D. Yes

V: From your own experience, this is actually true? A higher % of students complete the formative assignments? Not all of them of course, I remember you nagging about this, but you have an increased engagement / involvement?

D: Some students they need time to realize that if they don't do the assessments and they start collecting absences this will potentially lead to a failure. It takes them some time to get themselves to remember to do the assignments, or to engage with the readings. Sometimes they tell me they forget, some students even told me they had to add reminders to their phones to remind them to do the assignments, because they are not used to it, however at some point all of them have to do it, otherwise they have the danger of failing due to absences

V: Since you mention this thing about students needing time to actually get it together, a transition / orientation period. What is the level of your course?

D: Liberal education, 1000 course, not OU validated, for the whole population, not program specific. One pre-requisite, XXXX or XXXX.... I have from freshmen to graduating seniors

V: Have you seen a different approach.. perhaps the senior students were the ones easier to adapt?

D. No, seniors were the least open to change, they are more used to the old, traditional model, just attending the lectures and then not doing the [formative] homework and probably studying a few days before the exam / project. In my experience it depends on the student, because I've been teaching this for many years. Usually the ones who tend to not do the assignments and get troubled with absences are the ones almost ready to graduate..

V. So the freshman nature of the course is not really an obstacle, on the contrary, you believe it will be easier for incoming freshmen to adapt to the BL.

D. Yes

.....

Transcription Excerpt - Students' Focus Group

'Section B' – April 4, 16:45-17:35, (in the classroom), 19 students present

I: Do you think that this course could become blended?

All-except S17, S18, S19 : Yes – but to a certain extent

S1: I think 40%, not the maximum 50%. Being in the classroom is better, you don't get easily distracted S2: F2F is better for explanation

S3: Yes, I agree

S4, S5, S6, S7, S8: Me too

S3: If the class (students) are "productive" (*willing to study, attend, be careful, self-disciplined)* then it could go to 50% online.. but many students are not.. many students are physically in class, but not mentally.. so the online part would be even worse for those.. there will be nobody to "wake them up" S4: Yes, if students actually WANT to study, then online would work.. (but not ALL online though.. blended seems a nice idea)

S5: I attended an online seminar, I was SO bored.. I prefer F2F..

I f I stay at home, I get distracted.. even for boring classes and/or professors, I prefer F2F.. if the topic and/or the professor is interesting, then CERTAINLY F2F

S10 : Would office hours still be available?

I : Certainly

S1: Ooh, then blended seems a good idea..

S2, S3, S4, S9, S10, S11, S15, S16, S17, S18: Yes

S1: Office hours would be super important

S12: Although even when we are in class we tend to play with our phones, if we were to do this completely by ourselves at home, we would never focus.. we need the instructor!

S12, S15, S19: Yes

I: What features do you think would definitely remain F2F? That is, there is no way you'd like these online?

S1: Answering our questions

S3, S4, S5, S7, S9, S10, S11, S13, S15, S19: I agree

S3: Also, explanation of things

S1, S2, S4, S5, S6, S8, S9, S10, S12, S14: Yes, that too

S18: Introductory chapters

S17: Yes, the professor should explain the introduction of concepts otherwise we may not understand anything

S6: Lab should be mainly F2F.. if part of it has to go online, we'd need at least 5 lessons F2F.. we need to actually hear the instructor explaining what to do and how to do it

S5: It depends I think on the age.. the younger (18-19), the more distracted they get, the less focused you are.. so F2F is needed!!

S2: I disagree. Age isn't a criterion for attention span. What determines your attention span is mainly your internal drive.. F2F might be more efficient

There are several study abroad students who might be more comfortable with blended though.. so they will have time to see xxxx [the city]..

....

Transcription Excerpt - Instructional Designers' Focus Group

Instructional Designers (Dr. S.S, Dr. L.T., Ms. A.M.) - June 4, 11:00am, Dr. L.T.s office
V: Anything about BL, how we do it at the college that I will not be able to find there [the BL manual]? from your own experience?
L: we have new rules..we are not doing BL anymore actually, because American students aren't allowed to get grant if they take BL
V: So American students can't get a grant to come here for study abroad?
L: exactly.. I don't remember who exactly gives this..
S. They can't get federal financial aid (FAFSA) for BL programs, which is ok if they were only studying in the US, but for some reason if they study abroad they don't allow that.. unless they is a complete parallel program that's in person
L: only Greek students can get this psychology certificate (pg?)
V: I know that currently we do have very few undergraduate courses.. Despina teaches Turning data into decision, what else?
A: we have Psychology 1000, WP1212 one of the sections is BL, and we have one fully online undergraduate course, a multisection course, one section of it, Music 1000. Like 1070, students have a lot of opportunities to take any section they want.. one section is online.
V: Any words of wisdom regarding the potential transition of CS1070 to BL?
A: If it's possible, you could flip certain classes, you would have them work on their own at home on the theory instead of doing homework, and you could work on their homework in class. This is also .. more challenging in class
V: instead of turning the whole thing into BL you mean?
L: They would still have the tech online element, because they would have to do work online, as part as the homework, you know the amount of time they would spend on homework, they would spend it online, doing research, and then when you meet in class you can do clickers, games, anything..
V: well, they don't have an incentive to actually complete the online assessment..
S: That's the challenge because that model, which is great, the in-class activities, have to be built such that they are not able to do them if they haven't done the online.. 01:20
V: They don't really care..that is, several students they don't complete the activities, and then they come to class, and you tell them ok, now you need to provide this, they say "oh, I didn't do it".. so the other thing with BL is that they would get an absence.. actually some students mentioned that having this "stick" -instead of a carrot, it helped them.. so some students mentioned that "yeah, BI would be great, because you know, we actually have to work, otherwise if it was just an assignment.." because I also tried to give them an assignment that wasn't BL, I just asked them, for next time, try to research on this, a very interesting topic, and most students didn't complete it.. so at the end, when I asked them, they mentioned this..
A: Again, you will have to approve Susan.. but .. may be you could have the activity, the in-class activity, you would have this instead of some sort of assignment, we were doing this in Switzerland actually, instead of.. there was no final test in the end for some courses, there was a huge project, other than in-class activities..
V: so summative assignments, that they would give them a grade?
L: yes, and the in-class activities, would be that.. I don't know how it works exactly, because you could have various small summative assignments of 20% 20% 20%.. and if they miss that, they get it directly off
V: So they would get the penalty of not submitting..
…

Appendix II Participant Information Sheets

Participant Information Sheet - for Students

Lancaster University

Faculty of Arts and Social Sciences and Management School Research Ethics Committee (FASS-LUMS REC)

ETHICS APPLICATION FORM FOR STAFF and PhD STUDENTS

PISF – STUDENTS:

Participant information sheet

I am a PhD student at Lancaster University, and I would like to invite you to take part in a research study about investigating the transition from traditional, face – to – face delivery of an introductory computer course to a blended learning model.

Please take time to read the following information carefully before you decide whether or not you wish to take part.

What is the study about?

This study aims to investigate potential transition from traditional, face – to – face delivery of an introductory computer course to a blended learning model.

Why have I been invited?

I have approached you because you are currently a student of the Introduction to Information Systems module at our college.

I would be very grateful if you would agree to take part in this study.

What will I be asked to do if I take part?

If you decide to take part, this would involve the following:

Using a focus group you will be asked to orally provide your feedback on the following (taking about 50-60 minutes, in-class):

- How would you feel if this particular module became a blended one?
- Which parts of the course would you like to remain F2F and why?
- Which parts of the course would you like to become online and why?

Moreover, I may also contact you after the focus group session for a potential interview (10-15 minutes long) to further discuss the above.

What are the possible benefits from taking part?

Taking part in this study will allow you to share your views on the potential conversion of this module to a blended format. Moreover, your insights will contribute to our understanding of your preferences concerning the parts of the module that should remain face – to – face and the parts that should become online.

Do I have to take part?

v02-19

No. It's completely up to you to decide whether or not you take part. Your participation is voluntary. **If you decide not to take part in this study, this will not affect your studies and the way you are assessed on your course.**

What if I change my mind?

If you change your mind, you are free to withdraw at any time during your participation in this study. If you want to withdraw, please let me know, and I will extract any ideas or information (=data) you contributed to the study and destroy them. However, it is difficult and often impossible to take out data from one specific participant when this has already been anonymised or pooled together with other people's data. Therefore, you can only withdraw up to 3 weeks after taking part in the study.

What are the possible disadvantages and risks of taking part?
There are no known disadvantages or risks of taking part. You will only invest 50-60 minutes of your time.

Will my data be identifiable?

After the focus group and/or interview, only I, the researcher conducting this study will have access to the ideas you share with me. The only other person who will have access to what you contributed is a professional transcriber who will listen to the recordings and produce a written record of what you have said. The transcriber will sign a confidentiality agreement.

I will keep all personal information about you (e.g. your name and other information about you that can identify you) confidential, that is I will not share it with others. I will remove any personal information from the written record of your contribution.

How will we use the information you have shared with us and what will happen to the results of the research study?

I will use the information you have shared with me only in the following ways:
I will use it for research purposes, i.e. this will include my PhD thesis and other publications, for example, journal articles. I may also present the results of my study at academic conferences.
I may also share the results with other people at our College (colleagues, department head, dean, etc.) for the purpose of deciding on the potential implementation of the transition.

When writing up the findings from this study, I would like to reproduce some of the views and ideas you shared with me. I will only use anonymised quotes (e.g. from my interview with you), so that although I will use your exact words, you cannot be identified in our publications.

Lancaster University

Faculty of Arts and Social Sciences and Management School Research Ethics Committee (FASS-LUMS REC)

ETHICS APPLICATION FORM FOR STAFF and PhD STUDENTS

How my data will be stored

Your data will be stored in encrypted files (that is no-one other than me, the researcher, will be able to access them) and on password-protected computers. I will store hard copies of any data securely in locked cabinets in my office. I will keep data that can identify you separately from non-personal information (e.g. your views on a specific topic). In accordance with University guidelines, I will keep the data securely for a minimum of ten years.

What if I have a question or concern?

If you have any queries or if you are unhappy with anything that happens concerning your participation in the study, please contact myself (Vassilia Stefanou, v.stefanou@lancaster.ac.uk, XXXXXX, and/or my PhD supervisor, Prof. Don Passey, d.passey@lancaster.ac.uk, **tel: +44 (0)1524 592314, Department of Educational Research, County South, Lancaster University, Lancaster, United Kingdom, LA1 4YD**

If you wish to contact someone not involved in the study, then you may contact Prof. Carolyn Jackson, c.jackson2@lancaster.ac.uk, **tel. +44 (0)1524 592883, Head of Department, Department of Educational Research, Lancaster University, LA1 4YD, UK,**

This study has been reviewed and approved by the Faculty of Arts and Social Sciences and Lancaster Management School's Research Ethics Committee.

For further information about how Lancaster University processes personal data for research purposes and your data rights please visit our webpage: www.lancaster.ac.uk/research/data-protection

Thank you for considering your participation in this project.

v02-19

Participant Information Sheet - for Instructors

Lancaster University

Faculty of Arts and Social Sciences and Management School Research Ethics Committee (FASS-LUMS REC)

ETHICS APPLICATION FORM FOR STAFF and PhD STUDENTS

PISF – Instructors

Participant information sheet

I am a PhD student at Lancaster University, and I would like to invite you to take part in a research study about investigating the transition from traditional, face – to – face delivery of an introductory computer course to a blended learning model.

Please take time to read the following information carefully before you decide whether or not you wish to take part.

What is the study about?

This study aims to investigate potential transition from traditional, face – to – face delivery of an introductory computer course to a blended learning model

Why have I been invited?

I have approached you because you are an instructor of the Introduction to Information Systems module at our college.

I would be very grateful if you would agree to take part in this study.

What will I be asked to do if I take part?

If you decide to take part, this would involve the following:

During a 15-30 minute interview, you will be asked to orally provide your feedback on the following:

- How would you feel if this particular module became a blended one?
- Which parts of the course would you like to remain F2F and why?
- Which parts of the course would you like to become online and why?

What are the possible benefits from taking part?

Taking part in this study will allow you to share your views on the potential conversion of this module to a blended format. Moreover, your insights will contribute to our understanding of your preferences concerning the parts of the module that should remain face – to – face and the parts that should become online.

Do I have to take part?
No. It's completely up to you to decide whether or not you take part. Your participation is voluntary. **If you decide not to take part in this study, this will not affect your position in the College or your relations with any individuals in the College.**

v02-19

What if I change my mind?

If you change your mind, you are free to withdraw at any time during your participation in this study. If you want to withdraw, please let me know, and I will extract any ideas or information (=data) you contributed to the study and destroy them. However, it is difficult and often impossible to take out data from one specific participant when this has already been anonymised or pooled together with other people's data. Therefore, you can only withdraw up to 3 weeks after taking part in the study.

What are the possible disadvantages and risks of taking part?
There are no known disadvantages or risks of taking part. You will only invest 15-30 minutes of your time.

Will my data be identifiable?

After the focus group and/or interview, only I, the researcher conducting this study will have access to the ideas you share with me. The only other person who will have access to what you contributed is a professional transcriber who will listen to the recordings and produce a written record of what you have said. The transcriber will sign a confidentiality agreement.

I will keep all personal information about you (e.g. your name and other information about you that can identify you) confidential, that is I will not share it with others. I will remove any personal information from the written record of your contribution.

How will we use the information you have shared with us and what will happen to the results of the research study?

I will use the information you have shared with me only in the following ways:
I will use it for research purposes, i.e. this will be included in my PhD thesis and other publications, for example, journal articles. I may also present the results of my study at academic conferences.
I may also share the results with other people at our College (colleagues, department head, dean, etc.) for the purpose of deciding on the potential implementation of the transition.

When writing up the findings from this study, I would like to reproduce some of the views and ideas you shared with me. I will only use anonymised quotes (e.g. from my interview with you), so that although I will use your exact words, you cannot be identified in our publications.

How my data will be stored
Your data will be stored in encrypted files (that is no-one other than me, the researcher, will be able to access them) and on password-protected computers. I will store hard copies of any data securely in locked cabinets in my office. I will keep data that can identify you separately from non-personal information (e.g. your views on a specific topic). In

accordance with University guidelines, I will keep the data securely for a minimum of ten years.

What if I have a question or concern?

What if I have a question or concern?

If you have any queries or if you are unhappy with anything that happens concerning your participation in the study, please contact myself (Vassilia Stefanou, v.stefanou@lancaster.ac.uk, XXXXXX, and/or my PhD supervisor, Prof. Don Passey, d.passey@lancaster.ac.uk, **tel: +44 (0)1524 592314, Department of Educational Research, County South, Lancaster University, Lancaster, United Kingdom, LA1 4YD**

If you wish to contact someone not involved in the study, then you may contact Prof. Carolyn Jackson, c.jackson2@lancaster.ac.uk, **tel. +44 (0)1524 592883, Head of Department, Department of Educational Research, Lancaster University, LA1 4YD, UK,**

For further information about how Lancaster University processes personal data for research purposes and your data rights please visit our webpage: www.lancaster.ac.uk/research/data-protection

Thank you for considering your participation in this project.

Appendix III Interview and Focus Groups Questions

Interviews / Focus Groups Questions

1) How do you feel / what do you think about this particular module becoming a blended one (what do you think might be the advantages? Or disadvantages?) Besides the few "sample" online sessions we did throughout this semester, do you have any other experience with online or blended modules?

2) Which parts of the course would you like to remain F2F, and why?

3) Which parts of the course would you like to become online, and why?

Appendix IV Coding and Themes

Figure App. 1 displays a sample of an excerpt of an interview transcript in NVivo, with the stripes to the right representing the various codes. The coding process was performed by going over the transcripts, selecting the parts that were relevant to specific themes, and then assigning these to one or more codes, existing or new.

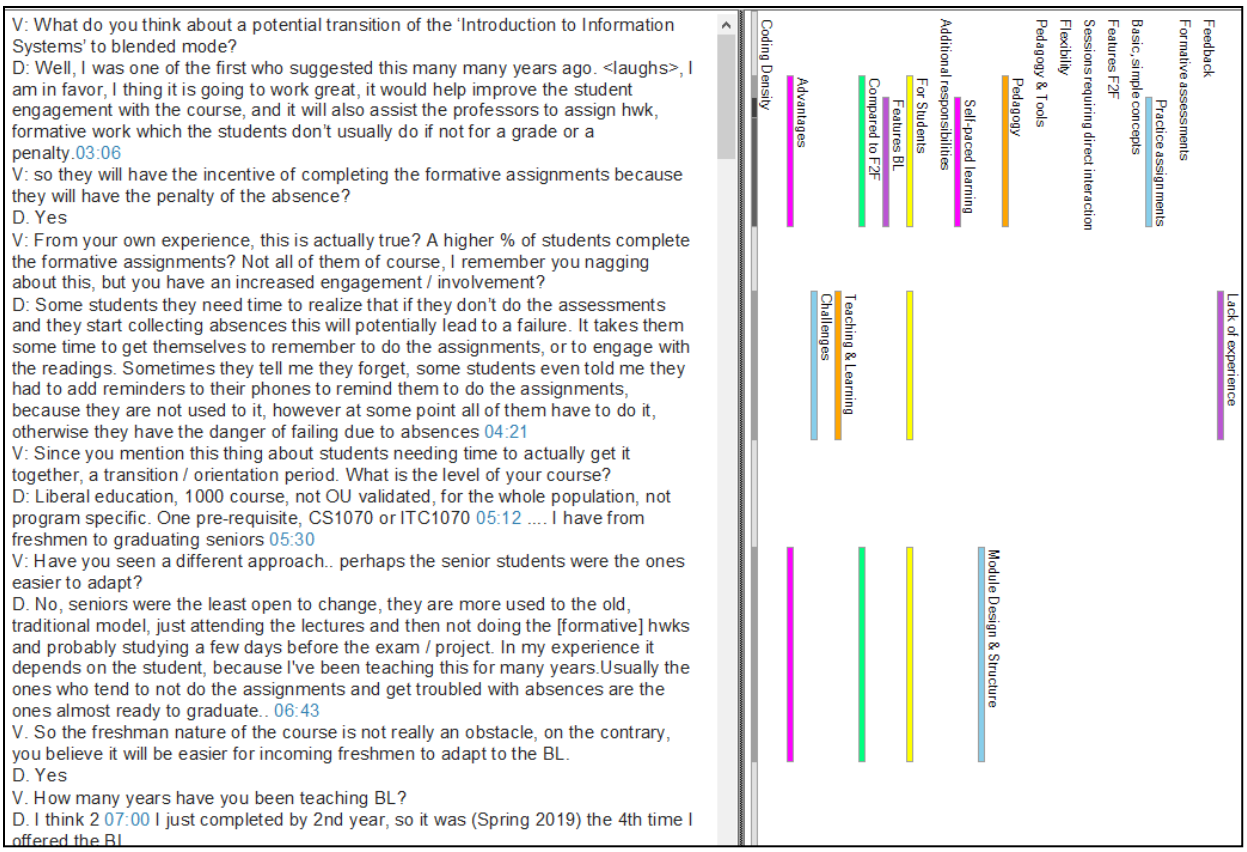
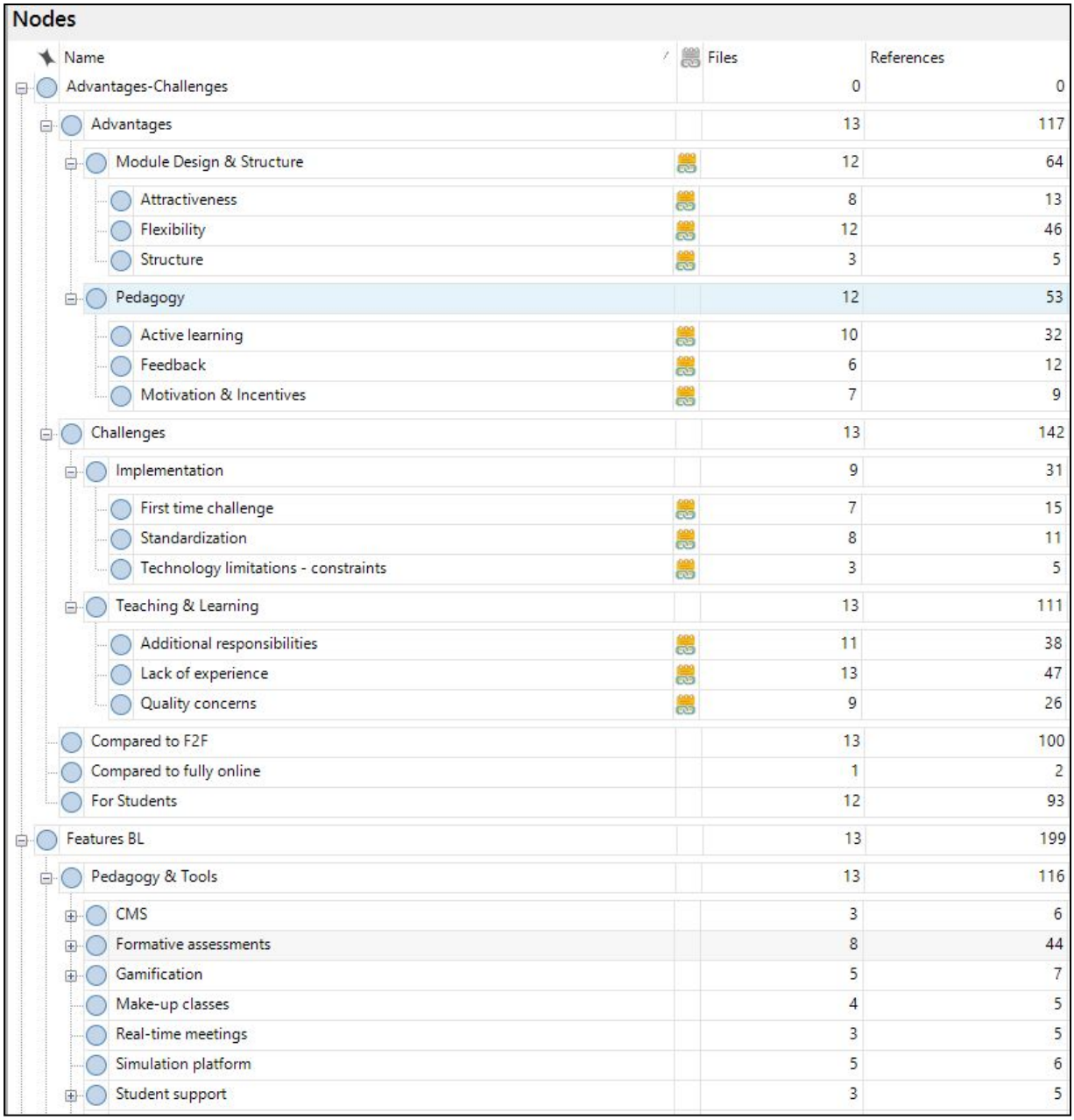


Figure App. 1: Excerpt Sample of a Coded Interview Transcript

Figure App. 2 displays a snapshot of the NVivo file portraying part of the themes and subthemes that resulted after the coding process.



Nodes

Name	Files	References
Advantages-Challenges	0	0
Advantages	13	117
Module Design & Structure	12	64
Attractiveness	8	13
Flexibility	12	46
Structure	3	5
Pedagogy	12	53
Active learning	10	32
Feedback	6	12
Motivation & Incentives	7	9
Challenges	13	142
Implementation	9	31
First time challenge	7	15
Standardization	8	11
Technology limitations - constraints	3	5
Teaching & Learning	13	111
Additional responsibilities	11	38
Lack of experience	13	47
Quality concerns	9	26
Compared to F2F	13	100
Compared to fully online	1	2
For Students	12	93
Features BL	13	199
Pedagogy & Tools	13	116
CMS	3	6
Formative assessments	8	44
Gamification	5	7
Make-up classes	4	5
Real-time meetings	3	5
Simulation platform	5	6
Student support	3	5

Figure App. 2: Snapshot of Themes and Subthemes