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Effective and Efficient Distance Learning Experience: The Role of Leanring Resources, Interaction, Communication and Collaboration

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Abstract
This research critically examines the effectiveness and efficiency of Distance Learning implementation by examining specific factors (learning resources, interaction, communication and collaboration among students, between students and instructor(s) and between students and content). Through the administration of an online survey instrument with both closed and open questions, the study examined the reflections and perspectives and identified the experiences of DL students. Eight hundred and four (804) students participated in the study. The findings revealed the importance of examining and evaluating the experiences gained from students and considering their needs when designing, developing and delivering DL programs of study.

Keywords: *higher education, students, distance learning, learning resources, interaction, communication, collaboration.*

Introduction & Theoretical Background

Various educational institutions around the world are offering Distance Learning (DL) programs for a while now. A successfully well-planned and designed DL course requires a demanding and complex process and various parameters to be taken into consideration (Cho and Cho 2016, 108-120; Ergulec 2019, 349-372; Pallof and Pratt, 93-96) which can be grouped in three levels: learner, course and instructor and organization (Martin, Sun and Westin 2020). Several elements related to the learner seem to play an important role such as: self-learning, learner resources, inclusiveness, ease of access, level of interaction and communication, engagement, personal characteristics (Arkoful and Abaidoo 2014, 397-410; Baber 2020, 285-292; Bolliger and Martin 2018, 568-583; Ghazi-Saidi et al. 2020, 370-383; Martin 2022, 162-177; Martin, Parker and Deale 2012, 227-261; Wahab 2020, 16-25). Other factors of success related to faculty members are: lecturers' pedagogical knowledge, training, support, workload, the provision of course access and flexibility, development of instructional design skills (Helms 2014, 804-810). At the university level, the policies and strategies employed by the university are also crucial. Specifically, collaborative leadership and 'properly resourced, achievable and sustainable' action plans (Garrison and Vaughan 2013, 24-28), in relation to the quality of IT infrastructure and services, the use of the available technology to its full potential considered to be extremely important (Alsabawy, Cater-Steel and Soar 2013, 431-451).

What makes DL efficient and effective? What do students need in order to characterize this

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experience successful? What do students need in order to have be satisfied from their DL experience? The current study focuses on learning resources and the level of interaction and communication among students, between students and instructor(s) and between students and content, given the importance highlighted and commented on the literature as well as the need to further examine the following: learning resources and specifically the use of more interactive material and the interactions, mainly learner-content interaction, as well as learner-learner and learner-instructor (Ayu 2020, 47-54; Padila Rodriguez and Armellini 2015, 298-317; Polas et al. 2020, 1050-1070; Sadaf, Martin and Ahgrim-Delzell 2019, 214-233; Thorpe 2014, 15-23; Xiao 2017, 123-135; Zimmerman 2012, 152-165).

Main Aim

The paper critically examines the effectiveness and efficiency of DL implementation at FredU via the DLPF, by examining specific factors that influence distance learning students' experiences. The following research questions guided the study:

1. How do the learning resources (readings, digital educational multimedia material, projects, quizzes, exercises, assignments) contribute to the effectiveness and efficiency of students' distance learning experience?
2. How do the interaction, communication and collaboration in the following 3 levels, influence distance learning students' experiences?

a. Among students,
b. Between instructor(s) and students,
c. Between students and content.

The Context

Frederick University (FredU) is one of the eight recognised private Universities operating in the Republic of Cyprus. It is an energetic and vibrant university, enjoying respect and recognition both nationally and internationally. FredU offers novel and innovative programs of study that address societal needs that exhibits high social sensitivity and responsibility. It has a strong focus on academic research, being one of the leading research organizations in the country. FredU has also developed the necessary experience and e-learning infrastructure for offering accredited programs of study through DL. It has been successfully offering DL programs since 2013, and has developed a solid educational framework of operation (Eteokleous et al. 2013, 10-13; Eteokleous and Neophytou 2019, 22-24). The Distance Learning Pedagogical Framework (DLPF) developed by the Distance Learning Committee of FredU, provides an academically sound framework within which programs and content is to be developed, and serves as the backbone of the design and delivery of DL programs of study. It was built upon various Online Pedagogical models such as the Five stage model of E-learning by Salmon (2004), and Salmon (2007,171-172), the Community of Inquiry Model by Garrison, Anderson and Archer (2000, 7-23), Garrison and Vaughan (2008) and Shea Bidjerano (2008, 339-361) and the ExConTra by Kostoulas-Makrakis (2012) as well as other research findings (i.e. Stephenson, 2001; Salmon, 2007; Watts, 2010) (See Fig. 1). It is consisted of three pillars: Directed Learning and Educational Material, Dynamic Online Interaction, and Assessment Activities.

The Distance Learning Pedagogical Framework (DLPF) @ Frederick University

The pedagogical framework of the distance learning programs/courses was developed after

resolving the following crucial issues: 1) the location of potential students (local, and/or European, and/or international students), 2) international trends, and research developments regarding the mode of delivery of distance learning programs and 3) requirements set by the Cyprus Agency of Quality Assurance and Accreditation for Higher Education (C.Y.Q.A.A.) and the Cypriot Council for Recognition of Degrees (KYSATS) in terms of accreditation of distance learning programs and the recognitions of degrees awarded from such programs. The pedagogical Framework is consisted of the following three pillars:

Directed Learning Online and Educational Material (Learning Activities) (Mandatory Content) (mandatory and supplementary bibliography/content and digital/multimedia content).

1. Dynamic Online Interaction, Communication, Interaction and Collaboration (Weekly Learning Activities)
2. Assessment Activities: (Final, Formative/Continuous and Self-assessment).

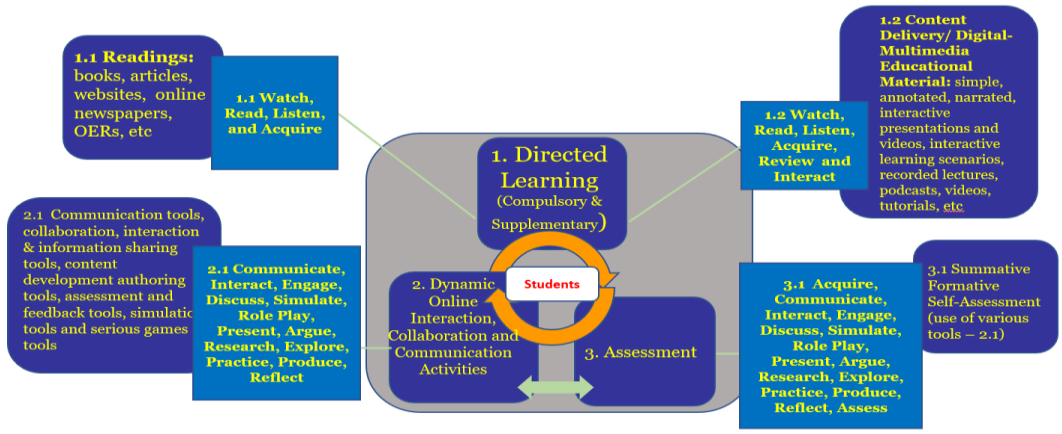

Figure 1: The Distance Learning Pedagogical Framework.

Directed Learning Online and Educational material

The aim of directed learning online activities is to introduce and explain the key concepts for each course. These activities aim to engage students in studying, reading, viewing or listening, permanent, static, online materials. These materials include the e-books, digitalized books, notes, readings from various sources (i.e. books, articles, websites, blogs, online newspapers, etc.). The Mandatory bibliography is available through the Learning Platform (provided that the principles of copyright are respected) and where there is a need for students to buy/borrow books, this should not be done excessively.

In addition, students are given educational content, or digital/multimedia material that includes digital bibliography, links, open access resources (OERs), eBooks, videos, etc. Also, the digital/ multimedia material includes the teleconferences recordings that take place through the Learning Platform via the use of ZOOM, and/or other educational videos, which are prepared by the teaching staff of the Subject Unit. Digital/multimedia material also includes various forms of presentations: simple, narrated and presentations with notes, video lectures, interactive presentations and interactive videos, audio files/podcasts, simulations, interactive gamification activities, interactive learning scenarios or other multimedia sources for material delivery (e.g. tutorials). The content included in a course is rich and contemporary, since it is constantly monitored and reviewed by the instructors. Artificial intelligence tools are employed

for various purposes and specifically, for educational material development in distance learning programs, as well as for the development of digital twins and avatars for weekly or unit summaries, as part of the material provided to students.

The materials used are classified into 'mandatory content' that must be studied by students or 'supplementary', which could be studied on a voluntary basis by students who wish to delve deeper into the thematic areas of a course. The supplementary/optional bibliography includes a collection of additional bibliographic titles, indicative for further study, but is not the subject of study for the subject module examinations. More specifically, students are also expected to independently engage (independent learning) in further study activities. These activities require students to study additional publications within the field (i.e. readings that are beyond the core content included in Directed Learning Online activities). These materials include Journal articles or key texts in the specific discipline, online videos or podcasts of theorists within the field and any other material that students will locate, on their own, from the vast online resources available. Courses are therefore carefully designed in order to encourage and stimulate students' independent learning.

Dynamic Online Interaction, Communication and Collaboration

The weekly dynamic online interaction activities engage students, in online discussions and collaborations but, not all of them contribute to assessment directly. The online interactive activities are designed in such way to provide students with opportunities to discuss, interact, share opinions, criticize and query their understanding of the key concepts introduced during the delivery of a course as well as to collaborate for the development of content/assignments. Within this context, online lectures (video and audio sessions) are organized by instructors. The online lectures aim for content delivery and explanation, students' presentations, discussions among students, and among instructor and student and their duration should be adjusted accordingly. Furthermore, within the context of the teleconferences there are group assignments and discussions, presentations, problem solving scenarios, role playing, etc. The duration of the teleconferences is an average of 2 hours.

Within the same framework, dynamic online interactive activities include the creation of discussion groups on the subject unit (e.g. personal statements, case study discussions, critical commentary of research articles), group simulation games, interactive problem-solving scenarios, the use of online tools for collaboration and co-content creation, the development of wikis for collective writing, the utilization of blogs and/or micro-blogs for discussion, argumentation, critique, commentary, feedback. The DL instructors are encouraged to use build-in platform tools (i.e. zoom for teleconferencing sessions, discussion forums, chat rooms, wikis) as well as digital tools outside the platform (i.e. websites, blogs, online documents, wikis). These activities allow students to develop their personal and peer online learning communities as well as participate in professional online learning communities.

Dynamic online interaction takes also place during week 0, where students use discussion forums for various purposes. First of all, discussion forums is used to get to know each to complement the absence of physical meetings. Additionally, a Q&A forum runs throughout the semester and it's been used by the instructors as well as the students for announcements, questions, news to share, important deadlines, etc.

Asynchronous communication

Asynchronous communication with distance learning students is crucial to the program's

success. Students are expected to communicate with their instructors via e-mail as well as via the electronic platform. In addition, students can communicate with their fellow students via email and the question-and-answer forums. Various technological tools for asynchronous communication such as e-mail and discussion forums can be used. Constant student support is also a crucial factor in DL programs. Thus, the instructor is also expected to be available to his students outside the hours of teleconferencing, in order to answer questions, or other issues regarding their studies and academic performance. Asynchronous communication also takes place via the Dynamic Online Interaction, Communication and Collaboration mentioned above.

Synchronous Communication

In addition, instructors are expected to meet students' requests for synchronous communication (e.g. face to face communication, telephone communication). The main synchronous mean of communication is the teleconferencing sessions. The organization of synchronous communication meetings is a compulsory responsibility of the instructor. The meetings must be carried out only through the provided platform (ZOOM) and must be available to students for asynchronous use at a later stage (recorded lectures). The content and organization of the meeting is solely decided by the instructor. Ideally, students should be informed about the time of the online meeting from the beginning of the semester (information to be provided in the course syllabus) but if this is not feasible, the time of the meeting should be announced on the LMS platform at least a week in advance. In the exceptional case that the course needs to be cancelled due to reasons beyond the instructor's control, the instructor is

responsible for informing the students directly and setting a new teleconference day and time. Apart from the organized synchronous communication, instructors are encouraged to provide additional communication meetings to support students with feedback, explanations and / or course requirements.

Assessment Activities

The evaluation method of assessing the student performance for each course, as well as the importance of different assessment methods for calculating the final grades are defined in the course outline (syllabus) which is given by the instructor during the preparation/induction week (Week 0). In each course, there are the following 3 assessment methods: 1) Final evaluation, 2) Continuous/formative evaluation and 3) Self-assessment.

Theoretical Background

A large number of studies within the domain of online learning have extensively emphasized the significance of student satisfaction in relation to student success (Muzammil, Sutawijaya and Harsasi 2020, 88-96). Prior empirical investigations have substantiated the presence of diverse variables influencing student satisfaction, with interaction emerging as a prominent focus in many studies impacting student satisfaction in online learning (Mandernach 2005, 1-10). This interaction encompasses various dimensions, including interactions among students, between students and their teachers/tutors, and between students and course content. Simultaneously, student engagement assumes a crucial role in determining student success within an online environment. Despite its acknowledged importance in cognitive development and knowledge construction conducive to successful learning outcomes (Banna et al. 2015, 249-261), limited research has explored the influence of student engagement on student

satisfaction.

The recognition of the significance of student engagement in online learning stems from its perceived correlation with students' cognitive development and knowledge construction, ultimately contributing to their success in learning (Banna et al. 2015, 249-261). However, a paradoxical challenge arises from the observation that students often encounter fewer opportunities for engagement with the institution in online environments (Martin and Bolliger 2018, 205-222). In light of this situation, the deliberate creation of student engagement becomes a crucial aspect in the administration of online learning to achieve desired levels of student satisfaction. Additionally, it is imperative to investigate how engagement is intricately constructed through interaction in the online learning context.

Within the realm of Open and Distance Learning (ODL) practice, student satisfaction emerges as a focal point, particularly in our university. Recent years have witnessed a decline in student enrollment, as noted by Sembiring (2017, 125-136). Existing literature and prior research consistently establish a close association between engagement and interaction in online learning, underscoring the importance of student engagement as articulated by Anderson (2003, 129-144). Martin and Bolliger (2018, 205-222) asserts that interaction serves as a catalyst for student engagement, with both factors recognized as essential contributors to student success in online learning. Given the critical nature of student success in an online environment, where students heavily rely on their individual learning abilities, Verneil and Berge (2020,13-18) highlight the pivotal role of student activity during the learning process in supporting online learning success. In addition to this, the researchers (Blasco-Arcas et al. 2013, 102-110) affirm that active learning in online environments is directly linked to interactions and engagement. Finally, Wang and Baker (2015,17-30) define student engagement as the effort students invest in participating in the learning processes of a specific course, emphasizing its pivotal role as a crucial variable in the effective implementation of online learning.

In accordance with research findings, the prevailing forms of interaction deemed integral to efficacious online courses, commonly implemented, align with the classifications identified by Moore (1993) and Bernard et al. (2009, 1243-1289). These classifications encompass (1) learner-to-learner interaction, (2) learner-to-instructor interaction, and (3) learner-to-content interaction.

Methodology

To address the aforementioned, a survey instrument was designed (Creswell 2013; Papanastasiou and Papanastasiou 2016). It was developed in Greek based on the grounds of other studies (Meletiou-Mavrotheris, Eteokleous and Stylianou-Georgiou 2022, 477; Meletiou-Mavrotheris, Mavrou and Rebelo 2021) and was pilot tested with ten students (excluded afterwards from the sample). After being revised upon received feedback, it was posted electronically via Google Forms. The instrument's reliability was checked with Cronbach's alpha ($a > 0.7$).

It took about 15 minutes to complete and consists of 6 parts and overall 16 questions (10 close-ended and 6 open-ended questions): (i) Demographics (3 questions); (ii) Degree of usefulness of different presentations types (3 questions); (iii) Degree of usefulness of digital multimedia material (2 questions); (iv) Degree of usefulness of the synchronous online meetings (8 questions); (v) Usefulness of the Introductory week (1 question); and (vi) Assessment and self-assessment (2 questions). DL students enrolled at FU's DL programs during Spring Semester

2022 was the population of the study. The Learning Management System used for the delivery of the DL programs is Moodle.

The data collection process lasted between May and June 2022. The quantitative data obtained from the survey's closed questions were analysed using descriptive and inferential statistics (SPPS 24 package was used). Analysis of the qualitative data obtained from the open-ended questions followed a qualitative thematic analysis approach (Braun, & Clarke, 2016; Guest, MacQueen, & Namey, 2012) during which data were coded and clustered as themes.

Eight hundred and four (804) students participated at the study (40% of the population), where 51.8% were female and 48.2% were male. All of the DL programs of study offered was represented at the sample. Finally, the majority of the students were attending their 2nd (27.6%), 3rd (24.1%) and 4th (31%) semester.

Analysis and Discussion

With reference, to the 1st research question and the role that the learning resources play (readings, digital educational multimedia material, projects, quizzes, exercises, assignments) to the effectiveness and efficiency of students' DL experience, the results provided important information. The majority of the students argued that it is preferable to have a variety of different presentation types. Specifically, they reported that was useful (20.1%) and very useful (53,4%) to have simple presentations, and useful (22.1%) and very useful (58,2%) to have presentations with notes. Along the same lines, they reported that was useful (22.1%) and very useful (45,5%) to have narrated presentations and useful (29.4%) and very useful (49,5%) to have interactive presentations and videos. They mentioned that it was also important to have this kind of educational material every week.

The students prioritized their preferences in regards to the different presentation types. The majority showed preference in interactive presentations and videos (49,3%). They seemed to have a slightly increased preference to the presentation with notes (39.6%) than the narrated presentations (33,5%). Students reported that the interactive presentations and videos were more live and kept their interest and motivation, and the presentations with notes and the narrated presentations were more explanatory. Nevertheless, as one student supported, the presentations with notes was possible to print out and read any time afterwards. The interactive presentations and videos can be used for revision purposes. They preferred to have narrated presentations that are short in duration, simple and comprehensive. A statistically significant correlation was revealed between the frequency of and variety of the presentations and their usefulness ($rs = 0.823$, $p = 0.000 < 0.001$). Additionally, the students reported being useful and very useful to have different types of educational material to study such as videos (39.8%, very useful), articles (29.6%, useful), various OERs/websites (29.6%, useful) and other multimedia educational material (50.7%, very useful). They found videos and case studies to be very useful, and preferred to have short and to the point multimodal documents and articles. The self-evaluation quizzes were evaluated by the students as an effective method of assessment (45%, totally agree and 47.6% agree) and were rated as extremely helpful (48.6%) and helpful (44.9%). They argued that the Introductory Week was important. More than half of the students strongly agreed (33.1%) and agreed (26.5%) that the resources and the content provided as very helpful throughout the course.

Concerning the 2nd research question as to how the interaction, communication and collaboration influence DL students' experiences, it revealed that students valued all three:

among students, between students and instructor(s) and between students and content. Students revealed to appreciate both synchronous and asynchronous communication, interaction and collaboration with their peers, their instructor(s) and the content. The vast majority reported that synchronous teleconferencing sessions were very useful (67.5%) and useful (15.9%). They argued that it was important to have the recorded lectures uploaded at the platform (80%, very helpful and 10.4% helpful) since it provided flexibility and helped in revising the material. Additionally, they characterized synchronous sessions as valuable and important since they reported that they always (42.3%) and very often (31.1%) participated at the sessions the time/day they took place. Along the same lines, the students reported that they always (35.4%) and very often (32.1%) watched the recorded sessions. Additionally, the majority preferred to have synchronous sessions every two weeks (45%) and once a month (29.6%). A statistically significant correlation was revealed between the frequency of planning the synchronous sessions and watching the recorded sessions and their usefulness ($rs = 0.245$, $p = 0.000 < 0.001$).

The student commented that they would like to experience a variety of activities during the synchronous sessions. Besides lecturing (51.9%, very useful and 27%, useful) the students seemed to be in favor of having the following activities: explaining course requirements and clarifying administrative issues (66.8%, very useful and 18.3%, useful), discussions between the instructor(s) and students and among the students in regards to the content of the course (60.7%, very useful and 23.6%, useful), working in groups (40.9%, very useful and 27.7%, useful), and presenting and discussing their work (31.6%, very useful and 23.3%, useful). The majority of the students also reported the "Get to know discussion forum" (28.6%, strongly agree and 49%, agree) and the "Q&A and announcements" forum (38.9%, strongly agree and 42.2%, agree) were of great use and extremely helpful. The students expected the instructor(s) to be in continuous contact and communication by posting weekly announcements, directions and reminders at the "Q&A and announcements forum" (58.1%, strongly agree, 28.6% agree). Finally, a statistically significant correlation was revealed between the frequency of posting at the "Q&A and announcement forum" and its usefulness ($rs = 0.492$, $p = 0.000 < 0.01$).

Conclusions

Learning resources play (readings, digital educational multimedia material, projects, quizzes, exercises, assignments) and interaction, communication and collaboration in three levels revealed to be extremely important for the students to have effective, efficient and successful DL experiences. In order to keep up with the needs and demands of the students and provide them with those opportunities that will help them advance and develop the appropriate knowledge, skills and competencies, DL environments should include the aforementioned elements. Backward design (Peffer 2018; Whitehouse 2014, 99-104), where learner needs analysis is the first step seemed to be appropriate and must be taken into consideration by higher education institutions. Learner needs should guide the design, development, and delivery of DL courses.

Distance, blended, open, flexible and personalized learning will dominate the education sector in the upcoming years. Thus, consequential and evaluative research on these fields becomes extremely important in identifying best practices and elements for improvement. The study provides insights on what learners need, on what to focus on, what elements to include and how to develop the educational material provided. The findings give guidelines on how to further improve the provision of DL learning programs of study by providing recommendations to instructors, instructional designers, course and program coordinators, and university officials. It

exemplifies the necessity to consider learners' needs in order to ensure equal opportunities, quality education, equity among learners as well as enhanced accessibility and usability for all learners through education strategies and the appropriate design of learning environments. Research-informed actions can be achieved through the results of this study.

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