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Critical factors affecting student satisfaction in a distance learning environment

Research Article

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Abstract: Student satisfaction plays a crucial role in assessing the effectiveness of distance education programmes. This is very important for the instructional design in higher education institutes and for educational decision-making and policy. The main purpose of the present study was to examine some key processes that affect learning in a distance education environment and how these influence student satisfaction. The study was conducted in the Hellenic Open University (HOU) through quantitative research involving students from three postgraduate programmes. The main variables examined were internet self-efficacy, student–student and student–tutor interaction, self-regulated learning skills of students and the satisfaction that they receive from participating in distance-learning courses. The results indicated that relatively high levels of these variables were observed, with the exemption of student–student interaction. The correlation coefficients amongst variables were all positive and statistically significant, but were small to moderate. Regarding the effect of demographic parameters, learner–tutor interaction is influenced by the number of modules completed by students, and satisfaction varies significantly between unemployed students and those who are full-time employees. Finally, a logistic regression model was developed with satisfaction as the dependent variable. Self-regulated learning and student–tutor interaction were identified as the main predictors of student satisfaction.

Keywords: *Distance education; Student satisfaction; Internet self-efficacy; Learner–tutor interaction; Learner–learner interaction; Self-regulated learning*

Introduction

The nature of distance education requires special procedures from the part of educational institutions. The educational material must be designed in a way that it serves the objectives of the course according to the principles of distance learning, while the interaction of students with their tutors and peers motivates students to get involved in the educational process (Moore, 1989). Self-regulated learning skills of students play an important role in distance learning. For example, due to the involvement of information technologies in the educational process, computer self-efficacy is critical for student performance (Joo et al., 2013) and educational effectiveness (Chien, 2012). Student satisfaction reflects on how students perceive their learning experiences, and it is therefore an important measure for the evaluation of educational programmes. Students who are highly satisfied are more persistent in the learning process and dropouts are reduced (Debourgh, 1999; Koseke & Koseke, 1991). Furthermore, student satisfaction contributes to academic success, since the more satisfied students are, the better they perform in their courses (Keller, 1983; Pike, 1993).

Student satisfaction is related to various factors, such as learner–learner interaction, learner–tutor interaction, self-efficacy and self-regulation (Artino, 2007; Reinhart & Schneider, 2001). Student satisfaction has a positive effect on students themselves, as satisfied students are more likely to choose the same institution again, if given the chance to revisit their college enrolment decision, and satisfaction with the college's climate has been identified as a significant predictor of the actual persistence in the following academic year (Schreiner & Nelson, 2013) also in distance education institutions; feedback and information derived from students contributes to a more successful programme design (Reinhart & Schneider, 2001).

To this end, the main objective of this study is to examine, in the context of an institute for distance higher education, the internet self-efficacy of students, the learner–learner and learner–tutor interactions, and the student self-regulated learning skills, as well as the relation of these parameters with the satisfaction that

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students receive from participating in their distance-learning courses. Another objective is to develop and propose a regression model that can be used as a predictor of student satisfaction, at least in relation to the parameters examined here. The identified parameters were based on an extensive literature review focussing on factors related to interpersonal relations. Such a model can supply learning design practitioners with the appropriate information to design activities giving emphasis on some of the most relevant parameters that enhance student satisfaction. The field of research regarding predictors of student satisfaction can be extensive. There are several factors that can influence student satisfaction and not all can be examined within the limited scope of a study like the present one. Based on the literature review and theoretical framework, the construction of a predictive model developed in the present study focussed on certain key processes concerning interpersonal relations such as (1) learner–learner and learner–tutor interactions and (2)personal characteristics, for example, self-regulation and self-efficacy since these are crucial components of distance learning and can reinforce its effectiveness.

Theoretical Framework

Satisfaction

Student satisfaction refers to the students' perceptions about their learning experiences and the perceived value of their distance education course (Kuo et al., 2013). It is a very important factor in the learning process. Student satisfaction is one of the four factors to be considered when designing a learning environment (Liaw & Huang, 2007).

Sun et al. (2008) showed that learners' computer stress, their attitude towards e-learning, the flexibility of e-learning courses, the quality of e-learning courses, the perceived usefulness, the perceived ease of use and the diversity in the evaluation are critical factors affecting the perceived satisfaction of learners. Gao et al. (2020) found that the emotional engagement and the perceived playfulness of the platforms used in a blended learning environment affect satisfaction. Moreover, with emotional engagement acting as a mediator, perceived usefulness, ease-of-use and interaction also affect satisfaction.

Lim (2001) found that computer self-efficacy was a significant predictor of learners' satisfaction in online courses as well as of their intention to attend future web-based courses. Lin et al. (2008) found that self-efficacy, social ability and task value significantly affect satisfaction from online learning courses. Student satisfaction along with self-efficacy can act as a substantial mechanism that stimulates students' academic performance and the overall satisfaction with their studies (Kostagiolas et al., 2019).

According to Joo et al. (2013), a very important predictor of learners' satisfaction, learners' achievements and their persistence is the perceived value of students' work. Therefore, the design of courses and the guidance of tutors should be directed to make learning experiences more useful for students. Task value, satisfaction and achievement were also found to have significant implications in the persistence of students. This means that students with high achievement levels tend to continue their studies, and therefore reduce the drop-out rate.

Liaw (2008) found that the perceived self-efficacy, multimedia teaching and the quality of the e-learning system are predictors of perceived satisfaction of learners. A study in the Hellenic Open University (HOU) has shown that there is a statistically significant relationship between student satisfaction and self-esteem (Vakoufari et al., 2014). In particular, it was found that as the levels of self-esteem increase, the greater the satisfaction becomes. Furthermore, significant correlations have been found between student satisfaction and tutors' performance, interaction between students and the evaluation of the course (Anagnostopoulou et al., 2015).

Li (2019) found that the massive open online courses (MOOCs) learners' satisfaction can be predicted by the academic level, by the number of online courses previously taken, which is an indicator of previous experience in distance learning, by the usage of self-regulated strategies and perceived learning.

Another trend in research regarding student satisfaction is the effort to link learning design metrics with student satisfaction; it was found that learner satisfaction was significantly affected be learning design (Rienties & Toetenel, 2016) and that assimilative learning design activities positively correlated with learner satisfaction. However, activities related to communication and finding information were negatively correlated with satisfaction. Learning design-related factors, such as delivery of teaching materials and learning activities, had a significant impact on learners' overall satisfaction irrespective of student- or module-related characteristics (Rienties et al., 2015).

Self-efficacy

Computer self-efficacy refers to a person's perceived ability to use a computer (Compeau & Higgins, 1995) and to carry out some activities related to computers. It is based on the concept of Bandura's self-efficacy

(1997), which is the conviction of an individual for his/her abilities. The measurement of computer self-efficacy indicates the confidence that one has in the use of computers and in the accomplishment of specific activities. According to the theory of self-efficacy, individuals undertake activities they believe they can accomplish, and they avoid situations where they believe they will fail. However, individuals with a strong sense of self-efficacy think that they can complete even difficult tasks. They treat them as challenges to be mastered, rather than as threats to be avoided (Bandura, 1994). People's beliefs about their self-efficacy can be developed through the influence of four factors: mastery experiences, vicarious experiences provided by social models, social persuasion and physical and emotional state. The beliefs about self-efficacy determine how people feel, how they think, how they motivate themselves and how they behave. These beliefs produce diverse effects through four major processes: cognitive, motivational, affective and selection (Bandura, 1994).

Shen et al. (2013) found that female students are likely to have higher self-efficacy in e-learning than male students, suggesting that female students can be more active, seek more help or work better than male students. Students who participated in more online courses were more likely to have higher self-efficacy in e-learning and to successfully complete an online course. Moreover, they were more likely to communicate and collaborate with other students in academic work. According to Joo et al. (2013), students with higher perceived levels of internal control, self-efficacy and task value were more satisfied with online courses. These three predictors exercised an indirect significant impact on persistence, since satisfaction exerts mediating effects between predictors and persistence. Chien (2012) found that high computer self-efficacy leads to higher effectiveness of training. Self-efficacy was also found positively correlated with online learning satisfaction (Al-Nasa'h et al., 2021; Carranza Esteban et al., 2022), while it reduced general anxiety and fear (Al-Nasa'h et al., 2021). Furthermore, students exhibiting high self-efficacy showed lower levels of depression and emotional exhaustion (Carranza Esteban et al., 2022).

Self-regulated learning

Knowles (1975), Moore (1980) and Brocket and Hiemstra (1991) defined self-regulated learning as a learning process where a student determines and has the ultimate responsibility for the purpose, content, method and evaluation of this process. Moore (1980) believed that when learners deal with difficult situations, they can seek information to acquire skills, set goals and determine the criteria for a successful effort in order to solve their problems.

Self-regulated learning includes metacognitive processes, procedures and behavioural motivation processes (Zimmerman, 1989). In terms of metacognition, self-regulated students plan, set goals, organise, self-monitor and self-evaluate during the procedure of knowledge acquisition. In terms of motivation, students exhibit high self-efficacy, self-performance and intrinsic interest. From a behavioural point of view, self-regulated students choose, plan and create environments that optimise learning. In the present study, we focus on metacognitive self-regulated learning, which is measured as the students' perceived ability to regulate their studies.

According to Pintrich (2000), self-regulated learning is defined as a dynamic and creative process in which students set learning goals and try to guide, regulate and control their reactions, which are determined or limited by their targets and the environmental context.

Hase and Kenyon (2000, 2007) introduced the concept of 'heutagogy', in relation to self-determined learning, as a holistic approach to developing learner capabilities, with learning as an active and proactive process and learners serving as 'the major agent in their own learning, which occurs as a result of personal experiences' (Hase & Kenyon, 2007). The tutor facilitates the learning process by providing guidance and resources, while fully relinquishing ownership of the learning process to the learner, who negotiates learning and determines what and how will be learned (Hase & Kenyon, 2000).

According to Corno (2001), the characteristics of students who regulate their learning are the following:

- They use cognitive strategies, such as repetition, processing and organisation, to represent, organise, edit and retrieve information.
- They plan, supervise and direct their cognitive strategies in order to achieve their goals; they have metacognitive skills.
- They have beliefs and feelings, which act as incentives and help them adjust.
- They organise and control their time and determine the effort placed on each task.
- They apply intentional and deliberate strategies to maintain their concentration, effort and enthusiasm.

Self-regulated learning includes the efforts made by the students to systematically manage learning processes to achieve their goals (Zimmerman & Schunk, 2011). Often, multiple structures explain the self-regulated learning of students (Artino, 2009; Azevedo, 2005; Cho & Jonassen, 2009; Zimmerman & Schunk, 2011). These structures include target setting, academic

self-efficacy and adjustment to the learning context (Pintrich, 2004). The competent self-regulated students were reported to have higher intrinsic orientation of goals and higher academic self-efficacy than the less-skilled on self-regulation students. Furthermore, the skilled self-regulated students regulate and adapt better to the learning process in different learning contexts (Pintrich, 1999, 2004; Zimmerman & Schunk, 2011).

Studies have reported that students' self-regulated learning is important to determine successful learning experiences, such as satisfaction and achievement in technological learning environments (Artino, 2008; Greene & Azevedo, 2009; Li, 2019). Moreover, it was shown that students' self-regulated learning has a parallel mediating effect in the relationship between interaction and satisfaction (Wu et al., 2023). However, self-regulated learning is difficult for many students, especially in an online learning environment that may lack direct support; as a consequence, students may feel lost and socially isolated (Cho et al., 2010; Sun & Rueda, 2012). Ali and Leeds (2009) found significantly higher drop-out rates in online courses than in face-to-face classes. Lee and Choi (2011) found that the lack of capacity for self-regulation of online learning students is an important reason for the high number of dropouts.

Interaction

According to Moore (1989), there are three types of interaction – and therefore three types of transactional distance – namely learner–tutor interaction, learner–learner interaction and learner–content interaction. The present study examines two of the three types of interaction that Moore suggested: learner–learner and learner–tutor interactions. Interaction is the good and effective communication between the teacher and the student, as well as between the students themselves; it contributes to the gradual self-confidence of the student and consequently in the achievement of his/her goals. The tutor through this interaction covers the needs of the students both in the learning level and in the sentimental one (Holmberg, 1995). Interaction also encompasses constructive discussion, which is achieved through technological means, including synchronous communication. The lack of interaction leads to the increase of the transactional distance, that is, of the psychological and communicative space between a teacher and a student, or otherwise the distance between the teacher's input and the student's actual perception in an educational programme (Moore, 1989).

Learner–learner interaction is the interaction between two or more learners, alone or in group settings, with or without the presence of the tutor (Moore, 1989), by which they exchange information, thoughts or ideas about course content (Moore & Kearsley, 1996). The interaction between students is measured as the level of interaction that students perceive that they experience with their peers. It refers to the exchange of ideas, cooperation in carrying out assignments, as well as to the provision of comments and feedback.

Learner–learner interaction includes a mutual bidirectional communication between two or more students, which is extremely useful and essential for the learning process (Moore, 1989). While interacting with other students, the students can exchange ideas and get feedback from each other. An ideal distance-learning programme gives learners the opportunity to communicate with each other synchronously via teleconferencing, just as they would in traditional classroom situations, and asynchronously via message boards and email lists. Some programmes include distance and/or face-to-face meetings to provide group interaction (Moore & Kearsley, 1996). Due to the use of high-tech devices for interaction in distance education, Hillman et al. (1994) suggested a fourth type of interaction, that is, between learner and interface.

Fotiadou et al. (2017) found a statistically significant positive correlation between autonomy and both learner–learner interaction and teacher–learner interaction. Kassandrinou et al. (2014) found that most participants in their survey, who were postgraduate students at the HOU, were reluctant to communicate with their fellow students or did not consider it necessary to take the initiative to communicate and interact with other students, especially during group counselling meetings. Similar results were obtained in other studies on communication and interaction between students within the HOU courses (Angelaki & Mavroidis, 2013; Loizidou-Chatzitheodoulou et al., 2001; Tzoutza, 2010). Learner–learner interaction helps the exchange of ideas and information and enhances experiential learning. The lack of interaction between learners is a big problem in distance education. The absence of activities favouring interactions leads to the isolation of the learners (Belanger & Jordan, 2000). However, in modern e-learning environments, the synchronous or asynchronous interaction allows students not only to share information but also to determine how to retrieve useful information (Liaw, 2008). In this context, instructors are required to promote learning tasks based on collaboration and discussion to enhance learner–learner interaction (Kara et al., 2021).

Regarding learner–tutor interaction, the tutors seek to stimulate or maintain the students' interest and to motivate the students to learn, by considering self-direction and self-motivation (Moore, 1989).

They provide advice, support and encouragement to each student, depending on the educational level, the personality and the philosophy of each student and other such factors (Moore, 1989). Learners are not perceived as passive recipients but as autonomous and responsible individuals, who actively participate in the learning process (Lionarakis, 2009). Many studies, such as those of Tait (2003) and of Thatch and Murphy (1995), have shown that interaction with the tutor affects the effectiveness of distance learning, as the skills regarding immediacy and individual feedback contribute to satisfaction and learning. Anderson (2003), Battalio (2007) and Jung et al. (2002) observed that an increase in the teacher–learner interaction leads to increased satisfaction. Moreover, Turhangil Erenler (2020) examined all types of interaction within course delivery and found that they had significant positive effects on student satisfaction.

On the other hand, there are occasions where the interaction between learners and participation in group activities leads to reduced satisfaction (Berge, 1999; Northrup et al., 2002). There are also cases where the relationship between the interaction of learners and satisfaction was moderate (Baturay, 2011) or they are sometimes positively correlated. Overall, it is considered that the interaction between learners is a poor predictor of satisfaction, while learner–teacher interaction (and learner–content interaction) is a good predictor (Kuo et al., 2013). Gray and DiLoreto (2016) also found that learner–learner interaction does not have a significant impact on student satisfaction, while the instructor's presence significantly affected student satisfaction, a relationship which was partially mediated by students' engagement.

Purpose of Study and Research Questions

The main purpose of this study is to examine the relationship between students' internet self-efficacy, student–student and student–tutor interaction, self-regulated learning skills of students and the satisfaction that students receive from participating in distance-learning courses. Furthermore, the effect of gender, age and other demographic characteristics on satisfaction, self-regulated learning, internet self-efficacy and learner–learner and learner–tutor interaction is estimated.

The research questions of this study are:

RQ1: What is the extent of (a) satisfaction of students from their learning experience, (b) self-regulating learning, (c) internet self-efficacy, (d) interaction with their tutor and (e) interaction between students?

RQ2: Are there any statistically significant differences in the examined parameters in relation to the different categories of demographic factors (i.e., gender, age, employment status, academic level, number of modules, previous experience in distance education, graduate curriculum, school)?

RQ3: What is the correlation between student satisfaction from their learning experience and the other factors under consideration?

RQ4: Can a regression model adequately estimate the probability that distance learning participants feel satisfied, when the values of the independent variables included in the model are known?

Method

Participants

The HOU consists of four schools, namely applied arts, humanities, science and technology, and social sciences. It offers both undergraduate and postgraduate courses through open and distance education, using various methods for distance learning. The participants of this study were 122 postgraduate students, who attended three different distance-learning postgraduate programmes at the HOU. In particular, 66 (54.1%) students attended the programme 'Master in Education' of the School of Humanities, 34 (22.9%) were enrolled in the programme 'Waste Management' and 22 students (18.0%) in the programme 'Environmental Design of Cities and Buildings' of the School of Science and Technology. Students attending these postgraduate programmes have to successfully complete four course modules and to submit a postgraduate dissertation to obtain their postgraduate degree (more recently, this practice has changed and students can choose between attending a fifth course module and handing in a dissertation). For each course module they enrol in, students must hand in five written assignments, throughout the 10-month academic year, and take up exams at the end of it. Furthermore, each course module includes five face-to-face counselling group sessions (CGS). Participation in a CGS is not compulsory. Students should plan their own study during each course module while they are continuously supported by their tutor. The educational material is developed based on distance learning principles and is available to students in hardcopy before the beginning of the course. The course content, additional learning resources, the academic schedule, the submission of written assignments and the feedback from tutors, as well as communication with tutors and co-learners (through course and individual group fora) are accessed

through an online learning management system.

An overview of how each of the examined parameters is concretely implemented in HOU is provided below, especially since student satisfaction emanating from each of these parameters is implicitly linked to the way it is implemented in a specific learning environment:

Self-regulated learning, through: written assignments, self-assessment exercises, studying in the period between CGSs.

Internet self-efficacy, through: use of computers, synchronous interaction (Centra), asynchronous interaction (Moodle platform including forum, emails).

Learner–tutor interaction, through: CGSs, provision of comments and feedback to written assignments, student forum, interaction though emails and telephone.

Learner–learner interaction, through: CGSs, student forum, interaction though emails and telephone. No group assignments were included in the examined courses.

The data for this study were collected in 2015, that is, in the pre-COVID-19 period. The results of this study would be of further interest for educational research and practice in the post-COVID-19 era, due to the increased interest in distance education and for improving not only academic results but also student satisfaction under these conditions.

The socio-demographic characteristics of the students participating in the survey are presented in Table 1.

Data collection instrument

The tool that was used to collect the data was a questionnaire consisting of six subscales (see Appendix). The first part deals with questions on the demographic characteristics. These are gender, age, employment status, academic level, previous experience in using computers, number of modules, previous experience in distance learning and the graduate study programme that the students attended. In order to measure 'learner–learner interaction' and 'learner–tutor interaction', two subscales derived from the distance education learning environments survey (DELES scale) by Walker and Fraser (2005) were used. 'Self-regulated' learning was measured by the 'Motivated Strategies for Learning Questionnaire' MSLQ by Pintrich et al. (1993), as adapted by Kuo (2010). 'Satisfaction' of students participating in distance education was measured using a questionnaire based on the scale of Arbaugh (2000), adapted to the HOU by Vakoufari et al. (2014). Internet self-efficacy was measured using a scale developed by Eastin and LaRose (2000) to measure the belief of people about the use of technologies based on the internet (web-based technology), as adapted by Kuo (2010).

The calculation of Cronbach's alpha reliability coefficient for all subscales of the questionnaire used in this survey indicated the existence of internal coherence: for learner–learner interaction, it was equal to 0.827; for learner–tutor interaction, it was equal to 0.919, for self-regulated learning, it was equal to 0.701,

Table 1. Socio-demographic characteristics of the students participating in the survey

Variable			Percentage (%)
Gender	Men	58	48.5
	Women	64	52.5
Age (years)	£30	19	15.6
	31–40	55	45.1
	41–50	42	34.4
	>50	6	4.9
Educational level	Tertiary Technical Institute (ATEI) graduates	23	18.9
	University (AEI) graduates	71	58.1
	Master's	23	18.9
	PhD	5	4.1
Employment status	Fully employed	96	78.7
	Semi-/part-time employed	17	13.9
	Unemployed	9	7.4
Previous experience in distance learning	Yes	23	18.9
	No	99	81.1

for satisfaction, it was 0.909 and, finally, for internet self-efficacy, it was 0.908.

Data analysis

The data were processed and analysed using the IBM SPSS 21 software package. The absolute and relative frequencies and descriptive statistics were calculated. The Kolmogorov–Smirnov normality test was used to determine whether data analysis will be conducted with parametric or nonparametric tests. *T*-test for independent samples was used to check the differences between the mean values of satisfaction, learner–learner interaction, learner–tutor interaction, self-regulated learning and internet self-efficacy between the categories of the following variables: sex, faculty/school, and previous experience in distance learning programmes. One-way Analysis of Variance ANOVA was used to test the differences between the mean values of satisfaction, learner–learner interaction, learner–tutor interaction, self-regulated learning and internet self-efficacy, between the categories of the following variables: age, employment status, graduate curriculum, number of modules and academic level. The Pearson correlation coefficient was used for calculating the correlation between satisfaction, learner–learner interaction, learner–tutor interaction, self-regulated learning and internet self-efficacy. Finally, logistic regression was used to build a model that predicts the probability of distance learning participants feeling satisfied.

Results

Mean values of the examined variables

In respect to the first research question, the mean (M) and standard deviation (SD) of the variables were calculated (Table 2). Learner–learner interaction levels were moderate (M = 2.53, SD = 0.86), contrary to the values of learner–tutor interaction (M = 3.95, SD = 0.77), self-regulated learning (M = 3.55, SD = 0.51), student satisfaction (M = 3.67, SD = 0.91) and internet self-efficacy (M = 3.77, SD = 0.79), which were higher.

Effect of demographic parameters

As the five variables follow a normal distribution, independent samples *t*-test were used to identify any differences in mean values between males and females. In all five variables, the *p*-value is greater than the $a = 0.05$ significance level, which does not allow us to reject the null hypotheses, according to which there are no differences in mean values between men and women. To test the differences in mean values between the groups of students with or without previous experience in distance learning, an independent samples *t*-test was also used. The average learner–learner interaction, learner–tutor interaction, self-regulated learning, student satisfaction and internet self-efficacy among individuals, who have previous experience in distance learning and those who do not, did not differ statistically significantly. In all five variables, the *p*-value is greater than the significance level $a = 0.05$, which does not allow us to reject the null hypotheses, according to which there are no differences in mean values between individuals who have or do not have previous experience in distance learning. Similarly, an independent samples *t*-test was used for controlling the differences between the respondents participating in courses of the School of Humanities and the School of Sciences and Technology. All the *p*-values are greater than the significance level $a = 0.05$, which does not allow us to reject the null hypothesis, according to which there are no differences in mean values among students from the two schools. Furthermore, the differences in the averages of the five variables by age group (≥30 years, 31–40 years, 41–50 years and >50 years) were studied with one-way ANOVA. The results showed that there were no statistically significant differences between the age groups for all five variables, as the *p*-value in all cases is greater than the $a = 0.05$ significance level.

Regarding the effect of the employment status on the variables: learner–learner interaction, learner–tutor interaction, self-regulated learning and internet self-efficacy, the *p*-values are greater than the significance level $a = 0.05$ (Table 3). For the variable student satisfaction, ANOVA showed a statistically significant difference between the categories of employment status ($F = 3.366$, $p = 0.038 < 0.05$). The averages of satisfaction in each employment status category were compared using the Tukey and Scheffe post-hoc criteria. This analysis indicated a statistically significant difference between the mean value of satisfaction among the categories of unemployed and full-time employed persons. More specifically, the Tukey and Scheffe test

Table 2. Mean and standard deviations

	Learner–learner interaction	Learner–tutor interaction	Self-regulated learning	Student satisfaction	Internet self-efficacy
Mean	2.53	3.95	3.55	3.67	3.77
Standard deviation	0.86	0.77	0.51	0.91	0.79

gave $p = 0.032 < 0.05$ ($p = 0.042 < 0.05$), with a mean difference of the satisfaction of the unemployed minus the satisfaction of full-time employed equal to -0.6005. Given that the average satisfaction of the unemployed is less than the average satisfaction of full-time employed, one-sided control with null hypothesis, 'H0: The mean satisfaction of the unemployed is not different from the average satisfaction of full-time employed', and alternative hypothesis, 'H1: The mean satisfaction of unemployed is less than the average satisfaction of full-time employed', resulted in $p = 0.016 < 0.025$ ($p = 0.021 < 0.025$). Therefore, the null hypothesis is rejected, which means that the satisfaction of the unemployed is less than the satisfaction of the fully employed.

Table 3. ANOVA results comparing the means of variables in relation to employment status

	F	Sig.
Learner–learner interaction	0.810	0.447
Learner–tutor interaction	0.127	0.881
Self-regulated learning	1.152	0.320
Student satisfaction	3.366	0.038*
Internet self-efficacy	0.525	0.593

*The mean difference is significant at the 0.05 significance level.

One-way ANOVA was also used to find out if there are statistically significant differences in the averages of the five variables in relation to (a) the level of academic studies (tertiary technical [ATEI]), tertiary university [AEI], Master's and PhD), as well as (b) the three postgraduate programmes (Studies in Education, Waste Management, Environmental Urban Planning and Building). The results showed that there were no statistically significant differences, as the *p*-value in all cases is greater than the significance level $a = 0.05$.

Moreover, differences in the averages of the five variables in relation to the number of course modules ($n = 1, 2, 3, 4$) that the students have already followed were investigated. Because the category '1 module' consisted only of one case, this category was rejected by the ANOVA analysis because the post-hoc criteria could not be calculated. It was found that the averages of all the variables apart from the learner–tutor interaction do not differ significantly (Table 4); for learner–tutor interaction, the ANOVA test showed that there is statistically significant difference regarding the number of modules ($F = 5{,}993$, $p = 0.003 < 0.05$). According to the post-hoc criteria of Tukey and Scheffe, there is not only a statistically significant difference in mean learner–tutor interaction between the category of 'two modules' and the category of 'four modules', but also between the category of 'three modules' and the category of 'four modules'. More specifically, the Tukey and Scheffe test gave a value of $p = 0.014 < 0.05$ ($p = 0.019 < 0.05$) with a mean difference 'two modules' – 'four modules' equal to -0.55 and $p = 0.025 < 0.05$ ($p = 0.034 < 0.05$) and mean difference 'three modules' – 'four modules' equal to -0.4144. As the average value of the learner–tutor interaction in the case of 'two modules' is lower than in the case of 'four modules', the one-sided control gave $p = 0.007 < 0.025$ ($p = 0.0095 < 0.025$), and therefore the null hypothesis is rejected, and the mean value of the learner–tutor interaction in the case of 'two modules' is smaller than the average value of the interaction in the case of 'four modules'. Similarly, because the average value of learner–tutor interaction in the case of 'three modules' is lower than in the case of 'four modules', the one-sided control gave $p = 0.0125 < 0.025$ ($p = 0.017 < 0.025$), and therefore the alternative hypothesis "The mean value of the learner–tutor interaction in the case of "three modules" is smaller than the average value in the case of "four modules"' is accepted.

Table 4. ANOVA results comparing the means of variables in relation to the number of modules

	F	p
Learner–learner interaction	1.061	0.349
Learner–tutor interaction	5.993	0.003*
Self-regulated learning	2.449	0.091
Student satisfaction	0.966	0.384
Internet self-efficacy	1.534	0.220

* The mean difference is significant at the 0.05 significance level

Correlation between the examined variables

Regarding the third research question, correlations between the variables (a) student satisfaction received from distance learning, (b) self-regulated learning, (c) internet self-efficacy, (d) learner–tutor interaction and (e) learner–learner interaction were assessed by calculating the Pearson correlation coefficient, after the Kolmogorov–Smirnov normality test reported that the variables follow the normal distribution. Table 5 shows that there are mainly small but statistically significant correlations between variables. More specifically, small or moderate statistically significant positive correlations at a significance level $a = 0.01$ appear between the variables (a) learner–tutor interaction and learner–learner interaction, (b) learner–tutor interaction and self-regulated learning, (c) learner–learner interaction and self-regulated learning, (d) learner–learner interaction and satisfaction, (e) internet self-efficacy and interaction with tutor, (f) internet self-efficacy and self-regulated

learning and (f) self-efficacy and satisfaction, as the *p*-values are less than the significance level *a* = 0.01. Furthermore, the correlation between the variables learner–learner interaction and internet self-efficacy is statistically significant, with a positive small correlation at the 5% significance level. Finally, moderate, positive correlations that are statistically significant at a confidence level of 1% were observed between the variables satisfaction and learner–tutor interaction, as well as between the variables satisfaction and self-regulated learning.

Regression model to predict student satisfaction

In order to proceed with the development of a logistic regression model, a new dichotomous variable was defined. The cases with average satisfaction ≥3 were defined to reflect a value of 1 in the new satisfaction variable. That means that those students feel satisfaction. On the other hand, the cases with average satisfaction <3 were defined to correspond to a value of 0 for the new variable of satisfaction, and thus we accept that those students do not feel satisfaction from their studies. The aim of the development of the logistic regression model is to estimate the probability that distance learning participants feel satisfied, when the values of the independent variables included in the model are known.

The method that was chosen to introduce the independent variables in the model is the Forward Likelihood Ratio (LR) and the variables were included into the model according to their usefulness. In the first model (Block 0), only the intercept is included. Thus, if it is assumed that someone is satisfied with distance education, without having any other information, then our assumption is correct by 77% (Table 6).

Wald test equals 31,643 beyond $p < 0,01$, which means that the model is statistically significant (Table 7). The conclusion is that this model is better than random guessing about student satisfaction when any knowledge of the independent variables is absent.

As different variables (self-regulating learning, internet self-efficacy, learner–tutor interaction and

Table 5. Pearson correlation coefficients

		Learner–learner interaction	Learner–tutor interaction	Self-regulated learning	Satisfaction
Learner–learner interaction	Pearson correlation	1			
	Sig. (two-tailed)				
Learner–tutor interaction	Pearson correlation	0.338**	1		
	Sig. (two-tailed)	0.000			
Self-Regulated learning	Pearson correlation	0.279**	0.294**	1	
	Sig. (two-tailed)	0.002	0.001		
Satisfaction	Pearson correlation	0.276**	0.465**	0.395**	1
	Sig. (two-tailed)	0.002	0.000	0.000	
Internet Self-efficacy	Pearson correlation	0.194*	0.260**	0.322**	0.315**
	Sig. (two-tailed)	0.032	0.004	0.000	0.000

*Significant correlation at the 0.05 significance level (two-tailed).
**Significant correlation at the 0.01 significance level (two-tailed).

Table 6. Classification table Block 0

Observed values			Predicted values		
			Satisfaction		Percentage correct
			0	1	
Step 0	Satisfaction	0	0	28	0.0
		1	0	94	100.0
	Overall percentage				77.0

a. Constant is included in the model
b. The cut value is 0.500

Table 7. Variables in the equation

	B	S.E.	Wald	Df	Sig.	Exp(B)
Step 0 Constant	1.211	0.215	31.643	1	0.000	3.357

learner–learner interaction) were tested to be added to the model, learner–tutor interaction was embedded in model 1, while in model 2, self-regulated learning was also incorporated. The -2log likelihood, which is a statistical measure of deviation between the observed and predicted values of the dependent variables, has fallen from 114.931 in the first model to 109.374 in the second model (Table 8). This indicates that adding the additional independent variable (self-regulated learning) in model 2 leads to an improvement.

Table 8. Model summary

Step	-2 Log likelihood
1	114.931[a]
2	109.374[a]

[a]Estimation terminated at iteration number 5 because parameter estimates changed by <001.

The Hosmer–Lemeshow test (Table 9) indicates that the -2 log likelihood is statistically significant since χ^2 is statistically insignificant for both models (χ^2 = 11,798, p = 0.16 >0.05) and (χ^2 = 4,165, p = 0.251 >0.05), respectively, and thus they are effective.

Table 9. Hosmer–Lemeshow Test

Βήμα	Chi-square	Df	Sig.
1	11.798	8	0.160
2	4.165	8	0.842

In Table 10, the observed and predicted values of the dependent variable for both models are presented. Model 1 classifies incorrectly 21 out of 28 students who felt satisfaction, predicting incorrectly that they felt satisfaction. Similarly, 4 out of 94 students who felt satisfaction were incorrectly classified as having felt no satisfaction. So, model 1 classified correctly 79.5% of the data. In model 2, however, the incorrect rates fell slightly: 19 out of 28 students who felt no satisfaction were incorrectly classified as satisfied from their participation in distance education. Thus, compared to model 1, the percentage of correct classification of unsatisfied students increased from 25% to 32.1%. However, the percentage of correct classification of satisfied students remained 95.7%. Overall, model 2 had an increased classification rate of 81.1%.

The values of coefficients B are statistically significant (Table 11). In model 1, learner–tutor interaction's coefficient equals 1.175 (Wald = 13.792, p = 0.000 <0.05) and the constant equals -3.244 (Wald = 7.468, p = 0.006 <0.05), whereas in model 2, learner–tutor interaction's coefficient is 1.005 (Wald = 10.087, p = 0.001 <0.05), self-regulated learning's coefficient is 1.101 (Wald = 5.166, p = 0.023 <0.05) and the constant equals -6.408 (Wald = 11.379, p = 0.001 <0.05).

Thus, model 2, which has a greater classification percentage is given by Eq. (1):

$$\log\left(\frac{\hat{p}}{1-\hat{p}}\right) = -6.408 + 1.005 \times (\text{Learner- tutor interaction}) + \\ +1.101 \times (\text{Self} - \text{regulated learning}) \quad (1)$$

where $\hat{p}$ is the probability of feeling satisfied by distance learning. Therefore, the probability of feeling satisfied is given by Eq. (2):

$$P(X) = \frac{1}{1 + e^{-(-6.408+1.005\times(\text{LTI})+1.101\times(\text{SRL}))}} \quad (2)$$

Table 10. Classification table

	Observed values		Predicted values		
			Satisfaction		Correct classification percentage
			0.00	1.00	
Step1	Satisfaction	0.00	7	21	25.0
		1.00	4	90	95.7
	Overall percentage				79.5
Step 2	Satisfaction	0.00	9	19	32.1
		1.00	4	90	95.7
	Overall percentage				81.1

a. The cut value is 0.500

Table 11. Variables in the equation

Variables in the equation							
		B	SE	Wald	df	Sig.	Exp(B)
Step 1[a]	Learner–tutor interaction	1.175	0.316	13.792	1	0.000	3.238
	Constant	-3.244	1.187	7.468	1	0.006	0.039
Step 2[b]	Learner–tutor interaction	1.005	0.316	10.087	1	0.001	2.732
	Self-regulated learning	1.101	0.485	5.166	1	0.023	3.008
	Constant	-6.408	1.900	11.379	1	0.001	0.002

[a]Variable(s) entered on step 1: Learner–tutor interaction.
[b]Variable(s) entered on step 2: Self-regulated learning.

where LTI is learner–tutor Interaction and SRL is self-regulated Learning.

Practically, when both LTI and SRL equal 3, the probability of feeling satisfied by distance learning is approximately 0.477 or 47.7%. If the value of LTI remains constant at 3 while SRL increases by one unit, that is, 4, then the likelihood of distance learning satisfaction will be approximately 0.733 or 73.3%. Correspondingly, if LTI and SRL equal 5, then the likelihood of feeling satisfied is approximately 0.984 or 98.4%. On the other hand, if LTI and SRL both equal 1, that is, if the student does not show any self-regulated learning abilities and does not interact with the tutor at all, then the probability of distance learning satisfaction is 0.013 or 1.3%.

In Table 11, the Exp (B) column is related to the odds ratio for all predictor variables obtained in the model. In model 2, the odds ratio of self-regulated learning is greater than that of the interaction with tutors. This means that self-regulated learning is a better predictor of satisfaction than learner–tutor interaction. The Exp (B) value for self-regulated learning is 3.008. This indicates that if self-regulated learning increases by one unit and interaction with teachers remains constant, then the relative probability of feeling satisfied will increase by 200.8% (3,008–1,000 = 2,008), where relative probability is the ratio of probability of satisfaction from distance learning to the probability of not being satisfied. Correspondingly, the exp (B) value for LTI is 2,732, indicating that if LTI increases by one unit and self-regulated learning remains constant, then the relative probability of feeling satisfied will increase by 173.2% (2,732–1,000).

Discussion

This study examined certain specific parameters related to distance education and their relation with the satisfaction that students receive from participating in distance-learning courses. The results indicated that the degree of satisfaction, self-regulated learning, learner–tutor interaction and internet self-efficacy were >3, corresponding to moderate levels. Only learner–learner interaction has a value <3, which is less than average. The results are in agreement with previous studies on self-regulated learning (Kuo, 2010; Michis, 2013), on satisfaction (Anagnostopoulou et al., 2015; Kuo, 2010; Michis, 2013; Vakoufari et al., 2014), on learner–tutor interaction (Fotiadou et al., 2017; Kuo, 2010), on internet self-efficacy (Chien, 2012; Kuo, 2010; Tsiaousi, 2014) and on learner–learner interaction (Angelaki & Mavroidis, 2013; Kassandrinou et al., 2014; Kuo, 2010; Loizidou-Chatzitheodoulou et al., 2001; Tzoutza, 2010).

The lower observed levels of learner–learner interaction in relation to those of other variables may be due to the reluctance of students to communicate with their peers or due to lack of initiative for interaction (Kassandrinou et al., 2014). We presume that the root cause of reduced learner–learner interaction is the way students deal with distance learning, since they are attached to traditional standards of traditional education. Students do not interact significantly with each other because, most likely, they face the physical distance that separates them as a barrier to communication, something they do not face in traditional education. Moreover, the structure of the programmes of HOU is not conducive to cooperation, and thus to learner–learner interaction. For example, the assignments are only individual. There are no group assignments that could possibly put the mechanism of interaction in operation (Kuo, 2010).

The degree of self-regulated learning is moderate to good, and therefore it can be accepted that the students have some of the features that, according to Corno (2001), students who normally regulate their learning have. The results show that more than 50%

of HOU students participating in this study operate in a self-regulated manner. When they are confused with something they read, they persist and try to understand it (78.6%, persistence and repetition). If the teaching material is difficult to understand, they change the way they read (63.1%, adaptation). They try to think carefully about a topic and decide what to learn from it, rather than just reading it (72.1%, plan). While studying the course, they try to determine which concepts they do not understand (86.9%). Furthermore, when they study, they set goals for themselves, so that they direct their activities in each study period (60.6%-set goals). However, there is room for improvement since in relation to some aspects of self-regulated learning, HOU students could perform better. For example, less than 50% of the students form questions that help them concentrate (42.6%). Moreover, only 40.2% of the students ask themselves questions to make sure they understand the teaching material and, finally, only 41.8% of HOU students appear to try to change the way they study so that it suits the requirements of the course and the style of the tutor.

The level of learner–tutor interaction was also high. This implies that students are provided with advice, support, encouragement and motivation from tutors, the main characteristics of learner–tutor interaction in distance education, as defined by Moore (1989). An important factor to the satisfactory level of learner–tutor interaction are the counselling group meetings set up by the HOU. There are five group meetings for every module, and they consist of a unique opportunity for tutors to offer psychological support to students and increase their self-confidence (Lionarakis, 2009).

Internet self-efficacy levels were moderate to good. It is important to improve internet self-efficacy, since students in general try things that they believe they can accomplish and do not attempt things on which they believe that they will fail. Towards a more technological-based education, students should be trained in the use of internet and computers by attending introductory lessons.

Satisfaction levels were also moderate to good, and efforts should be also made by the institution to improve them. Student satisfaction from distance learning programmes is an indicator of the success of the programmes. The majority of respondents believe that the distance learning programme that they attend does not prevail over programmes of traditional education. Perhaps their decision to attend a distance learning programme is due to the flexibility it offers. The respondents suggested that they are very satisfied mainly with the flexibility of the programme and not so much with its quality/superiority. Students are probably attached to the traditional way of education and maintaining a mixed model seems necessary to them, since it also entails higher interaction with tutors.

Regarding the effect of gender on the five variables, no statistically significant differences were found. These results agree with previous studies for learner–tutor interaction (Anagnostopoulou et al., 2015; Fotiadou et al., 2017) as well as for self-regulated learning and learner–leaner interaction (Fotiadou et al., 2017). As far as satisfaction is concerned, the findings of the current research are in agreement with those of Anagnostopoulou et al. (2015), Vakoufari et al. (2014), Michis (2013), Rienties et al. (2015) and Bacci et al. (2023). It is apparent that both women and men have developed self-regulated learning skills, and they perceive their interaction with colearners and their tutors in the same way and are satisfied by distance education. All the above studies have been conducted in HOU and this is the fact that enhances the validity of the findings. Regarding internet self-efficacy and self-regulated learning, the results do not fully agree with those of Shen et al. (2013); the differences between HOU's case and the case that is presented in Shen et al. (2013) can be explained by the different type of courses, which in the case of Shen et al. (2013) is fully online, and also by the different cultural background, since the current research is conducted in a European culture and environment.

The effect of age on the mean values of the five variables was statistically insignificant. Ke and Kwak (2013) found that age does not affect learner–tutor interaction and student satisfaction, while it does have an effect on learner–learner interaction, in the sense that older students spent more time and effort to process and digest other students' online posts and finally interact. It should be noted that Ke and Kwak (2013) study the nature of online courses, while HOU offers blended courses, where peer-to-peer online interactions are not a requirement. The results of the present study agree with those of Vakoufari et al. (2014), Rienties et al. (2015) and Bacci et al. (2023) regarding student satisfaction and of Fotiadou et al. (2017) regarding learner–tutor interaction. The lack of differences due to age is very important since it reveals an absence of age gap. It appears that all students who choose distance education programmes, despite their age differences, have a similar behaviour in relation to the examined parameters.

The effect of previous experience in distance education on the examined parameters was also statistically insignificant. This agrees with the results of previous studies [e.g. Anagnostopoulou et al. (2015), Vakoufari et al. (2014), Fotiadou et al. (2017)].

The number of modules that students have attended had a statistically significant effect on learner–tutor interaction: the more modules a student has attended, the greater the interaction he/she had with tutors. It is true that students of distance education cannot as easily communicate, exchange views and discuss possible problems with teachers as opposed to students in traditional education who are in constant contact with their teachers. Students with experience only in traditional education, such as most of the respondents, face difficulties to adapt to this new situation and to the different, multiple role of the tutor in distance education. As students gain more experience in distance education studies, they understand the new role of tutors and this leads to increased student–tutor interaction. Shen et al. (2013) suggested that students who follow more online courses were more likely to have higher technological self-efficacy and are more likely to communicate and collaborate with other students in academic work. This discrepancy with the present work, where the number of modules followed did not affect self-efficacy, is probably related to the format of the programme examined by Shen et al. (2013), which was an entirely online course, as opposed to the blended courses of HOU.

Furthermore, the differences in mean values of the examined variables in relation to the academic level were not statistically significant. This is attributable to the fact that all participants hold a first degree, and differences in their undergraduate degrees do not have an impact on the variables that interest the current study, as also observed by Vakoufari et al. (2014) and Michis (2013).

While the values of learner–learner interaction, self-regulated learning, learner–tutor interaction and internet self-efficacy had statistically insignificant differences in relation to employment status, regarding satisfaction, there was a statistically significant difference between the unemployed and full-time employed respondents. This difference can be explained as a result of the effect of unemployment in various aspects of life of the unemployed, such as economic, social and emotional. Studies in the HOU have fees, and this may also affect the difference between the two groups, together with the general frustration felt by unemployed people. Employment is crucial for the well-being, because it increases the perception of a person's worth and self-esteem (Goldsmith et al., 1996a), while unemployment leads to reduced self-control and despair emotions (Goldsmith et al., 1996b). According to Eichhorn (2013), the unemployment situation is associated with substantially lower life satisfaction by reducing the subjective well-being (Winkelmann, 2009). Especially for those who have invested time and money in their studies and have not been rewarded with similar labour earnings, frustration and, hence, reduced satisfaction from their studies is somewhat expected. Additionally, full-time employees tend to show more positive attitude to distance programmes because of the flexibility they offer within their already-busy schedule. Wagner et al. (2005) found a statistically significant difference in the satisfaction of full-time employees in relation to semiemployed employees. The effect of the flexibility of the programmes on the perceived satisfaction of full-time employees was also noted by Sun et al. (2008). Furthermore, Bacci et al. (2023) found a positive impact of the study conditions of working students on learning satisfaction and highlighted that flexible conditions of distance learning, with no time and space restrictions, that allows time management, constitutes a main advantage. Finally, the average values of the five variables in relation to the graduate curriculum did not differ significantly. This may well be due to the similar distance learning practices and the organisation of studies in a similar way.

Correlations between the variables considered in the present study were statistically significant and positive, but mostly low, except for correlations between satisfaction and learner–tutor interaction, as well as between satisfaction and self-regulated learning, which are higher and can be classified as moderate. This means that as the ability of self-regulated learning and the learner–tutor interaction increase, student satisfaction will increase; therefore, to increase student satisfaction, emphasis should be placed on enhancing self-regulated learning and interaction with tutors. Kuo (2010) and Kuo et al. (2014) also observed small or medium, statistically significant correlations. DeBourgh (2003) suggested that correlation between satisfaction and learner–tutor interaction was the only statistically significant correlation among the variables to be considered as predictors of student satisfaction, while Bolliger and Martindale (2004) found a high positive correlation between student satisfaction and learner–tutor interaction. This indicates the importance of the role of the tutor, as teacher, tutor, mentor and evaluator in distance education programmes. Concerning satisfaction and self-regulated learning, Puzziferro (2008) found that self-regulated learning had a statistically significant positive correlation with student satisfaction levels. As far as correlation between satisfaction and self-efficacy is concerned, Lim (2001), Lin et al. (2008) and Liaw (2008) found a positive correlation between self-efficacy and satisfaction. Self-efficacy is considered a considerable predictor of satisfaction.

Finally, the present study proposed a logistic regression model to predict student satisfaction. The model that emerged as optimal contains learner–tutor

interaction and self-regulated Learning. Furthermore, self-regulated learning is a better contributor to the prediction of the probability that one will be satisfied with distance education, than learner–tutor interaction is. The inclusion of self-regulated learning in the satisfaction prediction model is in agreement with Puzziferro (2008), while Kuo (2010) found that interaction with tutors is similarly an important predictor of student satisfaction, but he did not include it in his final model. The difference with the present research is due to the type of programme: Kuo's study is related (2010) to an exclusively online training programme, whereas in the present study blended-learning programmes are examined. The nature of the HOU programmes is such that it also entails communication between students and tutors through group meetings/ counselling sessions. Kuo (2010), examining a purely online course, suggested that teachers should post messages on discussion platforms more frequently and should answer students' questions as soon as possible to enhance their interaction. In the recent study of Li (2019) regarding participants in MOOCs, the use of self-regulated learning strategies was also a good predictor of learners' satisfaction. Students who used more advanced goal-setting and environment-structuring strategies perceived higher learning levels, resulting in being more satisfied with the courses. Results regarding the significant impact of learner–tutor interaction were also in accordance with Alqurashi (2019), indicating that high quality and quantity of interaction with tutors is more likely to result in high student satisfaction. The impact of learner–tutor interaction on satisfaction was found to be insignificant in the work of Wu et al. (2023); however, self-regulated learning significantly mediated the effects of interaction on satisfaction.

Kuo (2010) did not include the interaction between learners in the satisfaction model, similarly to the present research. Learner–learner interaction can occur when the programme requires specific collaborative activities, such as group discussions, teamwork or the exchange of ideas (Kuo, 2010). Because of low learner–learner interaction, as in the case of Kuo (2010), students primarily look for support in tutors. Alqurashi (2019) also found that learner–learner interaction did not have a significant impact on student satisfaction, which was mostly a matter of lack of benefit rather than of lack of quantity of interaction. Wu et al. (2023) considered that the insignificant effect of learner–learner interaction on student satisfaction is due to the design of classes that have limited learner–learner interaction activities. Puzziferro (2008), Rodriguez Robles (2006) and Kuo (2010) also showed that online self-efficacy was not a significant predictor of satisfaction, although it was statistically significantly correlated with satisfaction. In addition, 97.5% of the survey respondents stated that they have previous computer experience and may have developed a level of internet use that makes the effect of internet self-efficacy on satisfaction no longer significant/ relevant, as also suggested by Kuo et al. (2014).

Conclusions

The results of the present study have indicated that the levels of learner–tutor interaction, satisfaction, self-regulated learning and internet self-efficacy were high between the participants. It is therefore indicated that students participating in this study are provided with advice, support, encouragement and motivation. Moreover, learners show characteristics that are crucial for regulating the way they learn and carry out their studies, as well as the skills needed for the use of internet. Learner–learner interaction was at lower levels, which is partly explained by the individual writing assignments that give no incentives to the learners to collaborate and interact. Learner–tutor interaction is influenced by the number of modules that the students have attended; interaction is reinforced as learners gain experience in distance education. Furthermore, the employment status affected the student satisfaction, which was attributed to the flexibility offered by distance programmes to the fully employed as well as by the overall lower satisfaction levels related to unemployment.

The logistic regression model that was built to predict the probability of learners being satisfied by distance education consists of learner–tutor interaction and self-regulated learning as independent parameters. Self-regulated learning, in fact, contributes more to the prediction of satisfaction than learner–tutor interaction.

To this end, it is recommended that educational practitioners take into account the findings of studies like the present one, and use techniques and activities that enhance the key parameters of distance learning and therefore student satisfaction. The inclusion of learner–tutor interaction in the satisfaction model underlines the importance of introducing relevant practices. Therefore, it is proposed to HOU to maintain and enhance the effectiveness of group counselling meetings and introduce other methods that enhance the interaction of learners with tutors, such as the use of further online meetings. Since the second variable that contributes to the prediction of satisfaction is the self-regulated learning, the need to design courses that promote self-regulated learning and also the need for enhancement of self-regulation skills by the educational system are highlighted. In addition, the establishment and use of online collaborative groups and the establishment of group assignments are important, as there is a general perception that collaborative learning supports self-

regulation, since classmates model and discuss their own learning strategies and motivations, which are then distributed throughout the group. Thus, individuals can use and modify them to meet their own needs (Boekaerts & Corno, 2005).

Learner–learner interaction could be improved by using to a greater extent group-learning techniques in group meetings and beyond. This is now allowed also for online meetings (such as CGS through teleconference) through online platform features such as 'break-out groups'. Students can therefore work together in small groups, which enables achieving higher student satisfaction than in larger groups (Chou & Chang, 2018), while allowing more direct and meaningful interaction, and they can more effectively assist each other in the learning process. Tutors can also encourage students to participate in online learning and discussion groups (either during a CGS or between CGS), for example, by asking them to prepare a joint assignment or even by asking to evaluate some simple activities/small tasks by colearners (peer evaluation) and by discussing these evaluations in small groups. There are several ways to set up such activities; the tutor needs to be an initiator and a moderator whenever needed, but should also enable the students to take initiatives, to effectively interact with each other, and to move outside their comfort zone of conventional instruction.

More research could be conducted to provide further insight, taking into account also the limitations of the present study, such as the relatively small sample size. A study with a larger sample that also covers undergraduate programmes of HOU, or even programmes from other distance learning environments, would allow further generalisation. Moreover, the findings of a qualitative research would provide further insight into the relations between the variables under consideration and would allow the validation of the findings through triangulation. Another limitation of our study is related to the fact that there are many factors/dimensions that have an influence of student satisfaction, and we only examined a limited number. Future research could examine a larger number of parameters or completely different parameters that can influence student satisfaction. For example, another variable that would be interesting to investigate is learner–educational material interaction and how this affects student satisfaction. Furthermore, the development of a predictive model that includes a greater variety of variables, which have emerged from the literature as important for student satisfaction, but also in general for open and distance education, would be of interest. Such variables could include learner–educational material interaction, learner–interface interaction, social presence, internal control and perceptual self-esteem. Finally, the design and implementation of a similar research in the post-COVID-19 era will be interesting to allow comparison and to identify any possible differences or new features.

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Appendix

Questionnaire

I. Demographic data

Please tick X in the appropriate box.

1. Gender

Male Female

2. Age (years)

≤30 31–40 41–50 ≥51

3. Professional status

Unemployed Semi-employed Fully employed

4. Academic level

Graduate of Technical Education Institution (TEI)

University graduate

Master's degree

Doctorate

5. How many modules have you attended so far (including those of the current year)?

1 2 3 4

6. Do you have previous experience in distance learning (prior to the programme you are currently attending)?

YES NO

If YES, which one?

.....

7. Do you have previous experience in using computers?

YES NO

8. Which postgraduate programme are you attending?

Studies in Education

Waste Management

Other: .....

II. Scale for measuring interaction with co-learners

Please circle the number corresponding to your answer

(1 = Not at all, 2 = Slightly, 3 = Moderate, 4 = Fairly, 5 = Very)

9. In this course I work with others.

1 2 3 4 5

10. I discuss my opinions with other students.

1 2 3 4 5

11. I share information with other students.

1 2 3 4 5

12. I collaborate with other learners in the classroom.

1 2 3 4 5

13. I compare my work with the work of other students.

1 2 3 4 5

14. Group work is part of my activities.

1 2 3 4 5

III. Scale for measuring interaction with the teacher (tutor)
Please circle the number corresponding to your answer
(1 = Not at all, 2 = Slightly, 3 = Moderate, 4 = Fairly, 5 = Very)

15. When I have a question/questions, the tutor takes time to answer it.

1 2 3 4 5

16. The tutor helps me identify problem areas in my study.

1 2 3 4 5

17. The tutor responds promptly to my questions.

1 2 3 4 5

18. The tutor provides constructive feedback on my work.

1 2 3 4 5

19. The tutor responds adequately to my questions.

1 2 3 4 5

20. The tutor encourages my participation.

1 2 3 4 5

21. It is easy to communicate with the tutor.

1 2 3 4 5

22. The tutor provides me with positive and negative feedback on my work.

1 2 3 4 5

IV. Scale for measuring self-regulated learning

Please circle the number corresponding to your answer
(1= Strongly disagree, 2=partially disagree, 3= Not sure, 4= partially agree, 5= Strongly agree)

23. During lessons, I often miss important points because I think about other things.

1 2 3 4 5

24. When I study for my course, I make up questions to help me concentrate on the theme.

1 2 3 4 5

25. When I am confused about something I am reading, I persevere and try to understand it.

1 2 3 4 5

26. If the learning material is difficult to understand, I change the way I read it.

1 2 3 4 5

27. Before studying new learning material in detail, I read it superficially to see how it is organised.

1 2 3 4 5

28. I ask myself questions to make sure I understand the teaching material I have studied

1 2 3 4 5

29. I try to change the way I study to suit the requirements of the course and the style of the teacher.

1 2 3 4 5

30. Often, while I have read for my course I have not understood anything.

1 2 3 4 5

31. I try to think carefully about a topic and decide what I need to learn from it, rather than just reading about it.

1 2 3 4 5

32. When studying a lesson, I try to identify which concepts I do not understand.

1 2 3 4 5

33. When I study for my course, I set goals for myself so that I can direct my activities during each study period.

1 2 3 4 5

34. If I get confused when taking notes in class, I make sure to sort them out later.

1 2 3 4 5

V. Scale for measuring satisfaction from distance learning.

Please circle the number corresponding to your answer

(1 = Not at all, 2 = A little, 3 = Moderate, 4 = Quite a lot, 5 = A lot)

35. I am satisfied with my decision to attend the distance learning postgraduate programme at the Hellenic Open University.

1 2 3 4 5

36. I believe that the distance learning postgraduate programme meets my needs to a very large extent.

1 2 3 4 5

37. If I had the opportunity to attend a distance learning programme again, I would gladly do so.

1 2 3 4 5

38. I think the quality of the distance learning programme I attend is better than if I attended a programme in the same subject in the traditional way.

1 2 3 4 5

39. I think that attending the programme at a distance makes studying easier than in a conventional curriculum.

1 2 3 4 5

40. I would recommend distance learning at the Hellenic Open University to my friends/colleagues.

1 2 3 4 5

41. I believe that the university I attend has prestige and social recognition.

1 2 3 4 5

42. I consider my studies to be useful professionally and/or personally.

1 2 3 4 5

VI. Self-efficacy measurement scale

Please circle the number corresponding to your answer

(1 = Not at all, 2 = A little, 3 = Moderate, 4 = Quite a lot, 5 = A lot)

43. I feel confident in understanding terms/words related to internet connection and usage equipment.

1 2 3 4 5

44. I feel confident in understanding terms/words related to online software.

1 2 3 4 5

45. I feel confident describing the functions of internet connection and usage equipment.

1 2 3 4 5

46. I feel confident to solve problems that arise with internet connection/use equipment.

1 2 3 4 5

47. I feel confident to explain why a task/application does not 'run' on the internet.

1 2 3 4 5

48. I feel confident to use the internet to collect data.

1 2 3 4 5

49. I feel confident to gain advanced skills in a specific internet program for education/communication purposes (e.g. Centra, Moodle, etc.)

1 2 3 4 5

50. I feel confident to go to online discussion groups when I need help.

1 2 3 4 5