Assuring the quality of online learning in higher education: Adaptations in design and implementation

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In higher education, designing online courses aligned with students' preferences impacts learning effectiveness. Our research aimed to investigate which learning design elements can affect the quality of online learning. To achieve this, we followed a systematic literature review, identified current trends and conducted an online survey outlining university students' opinions. The results revealed that students' preferences agree with universal learning design principles, acting as course quality determinants. These elements relate to the structure, appearance, content, interactivity of the course and support in the online setting. We recommend that courses are well organised and include authentic resources, activities and assessments, divided consistently into smaller, topic-based chunks that resemble experiences drawn from real life. The objectives need to be communicated while the expected behaviours are known to students. The respective workload must be equally distributed across the course spectrum in an environment that balances collaborative and self-paced learning. Students must be familiar with the technology, which is also an easy-to-access gate. Lastly, it is suggested that technical and pedagogical support is constantly present so that participants efficiently work in the online context.

Implications for practice or policy:

- In collaboration with educators, instructional designers can use the quality indicators that emerged through the study when designing and evaluating higher education courses.
- Instructional designers and educators may prioritise learners' autonomy, aligning course requirements with students' sense of control.
- Instructional designers and educators can distribute students' workload equally throughout the course, without strict deadlines, to improve the learning experience.
- Educators may promote collaborative assignments but moderately balance them with an individual-based assessment mode.

Keywords: distance education, online learning, learning design principles, quality of online courses, mixed-method research

Introduction

The design of an online learning programme is a major factor affecting learning effectiveness. According to Fresen (2005), the learning design strategies impact the achievement of the learning goals. Specifically, learning centredness is highlighted as an approach to creating environments that primarily consider students' needs, such as the demands deriving from the distancing component (Shearer, 2021), accommodating teaching to meet them (Anderson, 2008). To increase learning effectiveness, it is important to establish interaction among all involved in the learning process (Chao et al., 2011). In the digital context, such learning principles provoke implications for structuring and designing the learning content, resources, support material and activities according to the objectives set.

Since online education has become an integral part of university programmes, promoting participants' e-learning readiness is vital (Dumulescu et al., 2021). The online learning context comprises elements of behaviourist approaches, cognitive learning positions and social learning premises (Johnson & Aragon, 2003). Most research is focused on integrating learning theories to investigate their implications for the design or their effect on students' performance. Afifi and Alamri (2014) stated that examining which learning principles are influenced by the applied theories is feasible. However, there is an additional need to compare the elements of the learning theories for informed decisions about the instructional process and methods (Khalil & Elkhider, 2016). Recent research has shown that instructors are not adequately prepared to develop and teach practical online courses (Nisiforou et al., 2021). Providing instructors and learning designers with best practice examples and uncovering design elements of positive and negative impact, equips them with the appropriate tools to expand their repertoire (Baldwin et al., 2018; Kibaru, 2018).

When revealing empirical findings, it is important to state students' opinions, and preferences since they are the target audience. Researchers have highlighted the need to identify the learners' profile (covering all aspects, such as their satisfaction, expectations, readiness and skills) to ensure the success and quality of online learning (Kebritchi et al., 2017; Van Wart et al., 2020). There are few studies, though, conducted in this area, synthesising and comparing such findings. Thus, further investigation into students' preferences and attitudes is recommended for future work (Adanır et al., 2020; Fidalgo et al., 2020; Myers & Schiltz, 2012; Trespalacios & Lowenthal, 2019).

Considering the above, our research aimed to provide insights into how online course design and delivery can be aligned with students' preferences, aiming for quality learning experiences. Therefore, the research was directed by the following questions:

(1) What are higher education (HE) students' preferences regarding online course design and delivery?
(2) Which factors can dictate the quality of online courses?

We conducted mixed-method research, which included a systematic literature review and an online survey, to answer the questions of the study. In this way, we examined, compared and interpreted students' preferences with the findings of previous studies. The innovation lies on the fact that a systematic review of the literature is the background of the online survey. We compared these findings to data gathered from an online survey measuring students' perceptions after redesigning a university course (Sahin & Shelley, 2008). Thus, the findings can be useful to practitioners, academics, instructors, designers and developers in distance education, prompting their application into everyday practices and directing them towards future experimentation.

Systematic literature review

To gather literature data in a targeted way, we followed a systematic review of the literature (SLR). Fink (2005) defined the SLR as "a systematic, explicit, and reproducible method for identifying, evaluating, and synthesising the existing body of completed and recorded work produced by researchers, scholars, and practitioners" (p. 3). Researchers define specific criteria to collect interrelated publications that will answer the research questions (Mengist et al., 2019). In the current study, Academic Search EBSCO's electronic database was accessed to search journal articles. The following keywords were applied: e-learning or online learning or web-based learning or remote learning or distance learning AND learning design AND course structure AND higher education AND learning management system AND strategies or methods or techniques. Using automation tools, specific inclusion criteria were chosen such as 2010–2021 publication period, English language, full text and peer-reviewed, academic journals, higher education subject, Boolean search mode and relevant subjects (excluded subjects such as massive open online courses, blended learning, adaptive learning, personalisation, learning styles, gamification and game-based learning, laboratory training, video-based learning, minority students, special education, only one type of activities, faculty attitudes, learning analytics, mobile learning, assessment).

The search resulted in 796 articles after the duplicates were removed. Through a detailed screening of abstracts, 525 articles were deemed irrelevant. The reasons that led to the exclusion of articles emerged during the screening phase were as follows: emphasis solely on blended learning (Reason 1), on specific technological tools (Reason 2), on COVID-19 and emergency remote teaching period (Reason 3), and studies examining a specific type of instruction (e.g., continuous professional development) (Reason 4). The researchers read the full text of the remaining 227 articles and excluded 185 due to their content being irrelevant to the research questions (HE students' preferences regarding learning design, learning strategies and course structure as well as factors that determine the quality of online courses) (Reason 5). As a result, 42 articles were deemed suitable for analysis and interpretation. The above search strategy is presented in Figure 1. We categorised the articles in topics inductively (individual patterns merged into broader topics) based on their content (Table 1). Two individual researchers were involved and agreed on the categorisation of the articles for transparency.

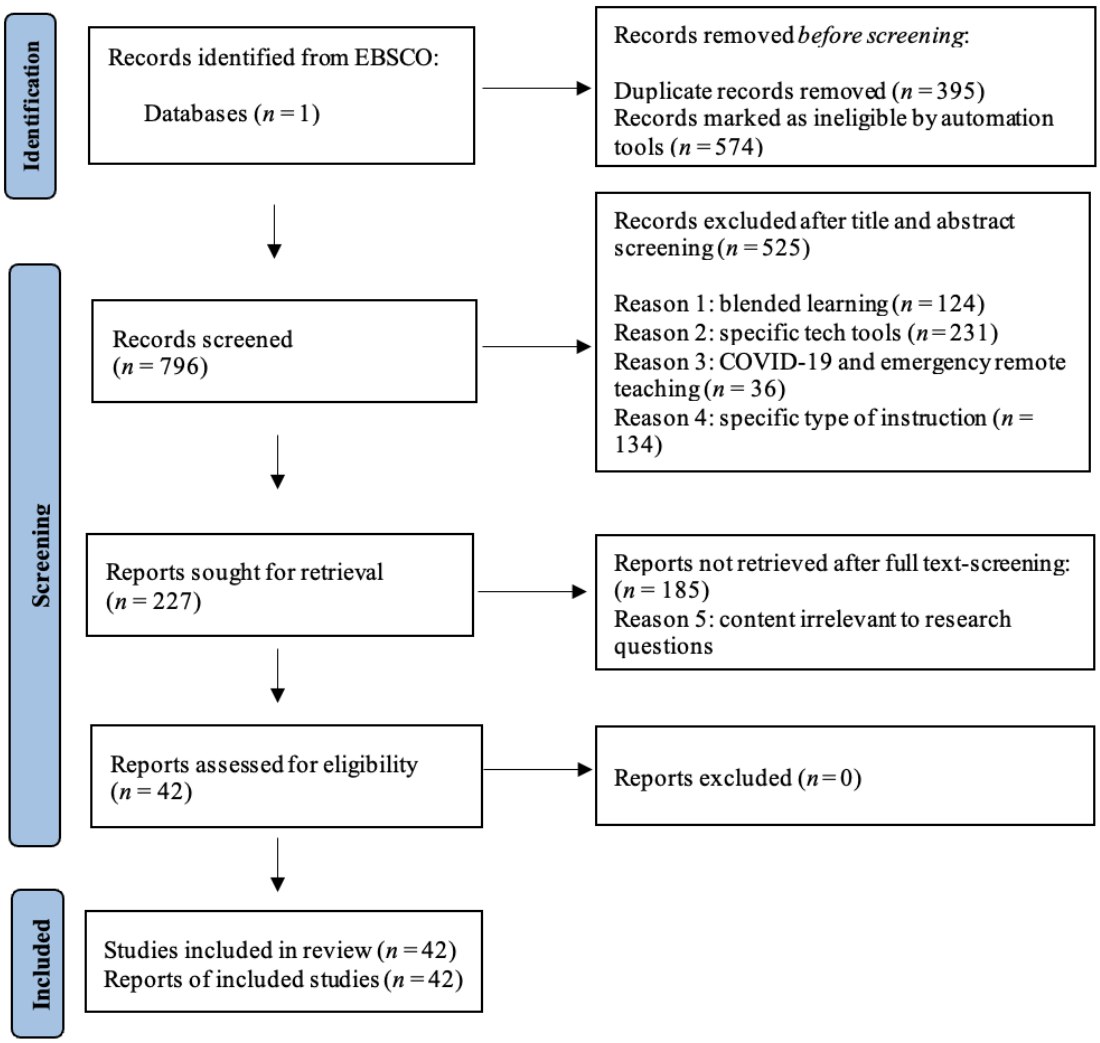

Figure 1. The SLR strategic process based on the PRISMA framework (Page et al., 2021)

Table 1
Categorisation of articles from SLR into topics

Topics	Author(s) and date of publication
Students' perceptions and preferences in distance education	Shonfeld (2021) Heilporn & Desrochers (2020) Adanır et al. (2020) Trespalacios & Lowenthal (2019) Kuzmanović et al. (2019) Lee et al. (2019) Ng & Baharom (2018) Topal (2016)
Learning design frameworks	McGahan (2018) Baldwin et al. (2018) Squires (2018) Robinson & Wizer (2016) Sorgenfrei & Smolnik (2016) Sugar & Luterbach (2016) D'Agustino (2012)
Online course design and structure	David & Frederick (2020) P. Vlachopoulos et al. (2019) Soffer & Nachmias (2017) Trout & Vela (2016) Lister (2014) Afifi & Alamri (2014)
Online teaching practices and strategies	Harris et al. (2020) Muljana & Luo (2019) D. Vlachopoulos & Makri (2019) Bolliger & Martin (2018) Britt (2015) Mykota (2018) Rhim & Han (2020) Richardson et al. (2015) Courtney & Wilhoite-Mathews (2015)
Learning management system (LMS) and platforms: Strategies and structure	Liu et al. (2020) Dlamini & Ndzinisa (2020) Abuhassna et al. (2020) Cacheiro-Gonzalez et al. (2019)
Quality of online course and instruction	Karam et al. (2021) Brown et al. (2018) Al-Fraihat et al. (2018) Eom & Ashill (2018) Uppal et al. (2018) Hadullo et al. (2017) Martin et al. (2016) Roehrs et al. (2013)

Students' perceptions and preferences in distance education

Students' perceptions of the online course they attend play a crucial role in their engagement and participation. In the research, seven studies examined students' preferences. One of the most essential elements is the existence of interaction. The learners value multi-level online interaction (Adanır et al., 2020). First, interaction with the instructors can be provided through comments in presentations, forum discussions and instructor-led weekly meetings (Heilporn & Desrochers, 2020), with emphasis on individual communication (Trespalacios & Lowenthal, 2019) and provision of adequate support (Ng & Baharom, 2018). Second, students need to work in a collaborative environment (Ng & Baharom, 2018). Mutual collaboration for the co-construction of knowledge can increase students' satisfaction (Lee et al., 2019; Shonfeld, 2021); a sense of connection derives from belonging to a group. Regarding assessment,

though, students might prefer individual assignments (Heilporn & Desrochers, 2020). Third, students usually expect more interactive features with the learning materials because this increases their engagement (Adanır et al., 2020).

The digital tools that facilitate interaction, chats, and forums in an LMS can enhance instructor-to-student contact (Adanır et al., 2020). Students are more satisfied when both interactions are enhanced through communication tools (e.g., a virtual classroom, forums), audiovisual content, and multidimensional material (Topal, 2016). However, students prefer using familiar tools, such as email, since they need time and skills to be comfortable with newly given tools (Trespalacios & Lowenthal, 2019).

In addition to interactivity, learners are pleased with a well-structured course. This includes dividing the content into asynchronous weekly modules with introductory guidelines, the material presented via comment-enriched slideshows and problem-oriented activities (Heilporn & Desrochers, 2020). A structured course with practical activities aligned with students' job-related needs is favoured (Trespalacios & Lowenthal, 2019). Specifically, the material needs to be engaging, with hands-on resources and meaningful activities that promote knowledge acquisition and applicability in future situations (Ng & Baharom, 2018). The learners' satisfaction is affected by their motivation to participate, their feelings about the learning process and their engagement in applying knowledge (Lee et al., 2019).

According to Kuzmanović et al. (2019), students' satisfaction is affected by how they approach the technologies, teaching method and assessment. They suggested that students could be either focused on acquiring knowledge through instructor-monitored collaborative activities or on the multifaceted assessment (e.g., peer-to-peer, interactive online quizzes) and constructive feedback. Similarly, immediate feedback makes students seem positive towards online exams (Adanır et al., 2020).

Learning design frameworks

According to our research, seven articles outlined frameworks and procedures for designing online learning experiences. Most researchers highlighted that the first step in the design process includes setting specific learning objectives (Baldwin et al., 2018; Robinson & Wizer, 2016) to develop higher-order thinking skills (D'Agustino, 2012). This is also evident in courses being re-designed where learning analytics and quality measurement scales (e.g., rubrics) can reveal what needs to be achieved and how (McGahan, 2018). The instructional strategies (direct and indirect, interactive instruction, experiential learning and independent study) and approaches need to be defined (D'Agustino, 2012; Robinson & Wizer, 2016), focusing on interaction. Among the most effective approaches is differentiated and personalised instruction to meet learners' characteristics (Sugar & Luterbach, 2016). Then, the assessment (formative, summative, authentic or alternative such as portfolios, projects) and the resources can be chosen, including the technological tools, based on the institutions' affordances and any limitations of the technology (D'Agustino, 2012). The content selected based on the objectives, requirements and students' needs must be divided into subtopics and smaller chunks. Such organisation serves scaffolding purposes, too (D'Agustino, 2012).

Regarding the activities designed, adult learners benefit profoundly when technologies control collaboration and individual learning, leading to the development of higher-order thinking and co-creation of knowledge (Squires, 2018). According to Sorgengrei and Smolnik (2016), learners' control over when and where (time and place) and how (navigation and design) to learn determine the learning process (e.g., the mental effort), which in turn positively affects the achievement of the cognitive and affective outcomes. Learners' autonomy, though, is affected by their motivation to manage the learning process, their abilities, self-regulation, beliefs about the reasons for success, the characteristics of the tasks and the learning conditions. For instance, an extremely high degree of autonomy may result in overload and difficulties in managing to learn. Thus, differences in individuals' characteristics and the course per se have implications for the learner-controlled online learning process. For this, scaffolding is necessary at all levels since adequate digital skills are a prerequisite for a successful experience.

During the design process, collaboration among instructors and e-learning practitioners seems to be a critical incident of success (Sugar & Luterbach, 2016). Additional emphasis should be given to ensuring students participate in the design process (Robinson & Wizer, 2016), by gathering feedback from students, for instance, through formative and summative evaluation, and reporting these observations to allow

practitioners to revise accordingly. Similarly, self-evaluation allows practitioners to reflect on their pedagogical competences, prompting further improvement (D'Agustino, 2012; McGahan, 2018).

Online course design and structure

The design and structure of online courses were explored in six articles. Soffer and Nachmias (2018) investigated the effectiveness of online courses concerning the structure, materials, online presence, communication, engagement and satisfaction. The course units consisted of video lectures (complemented by presentations and summaries), content-related and additional materials, assignments, general information about the subject, the instructor and specific guidelines. Communication was facilitated through emails and forums. In this context, online students exhibited a higher understanding of the course structure and content and better engagement and satisfaction. Therefore, meticulous design can establish successful experiences.

Additionally, David and Frederick (2020) examined the impact of multimedia on students' performance. The multimedia-enriched environment consisted of images, text, hyperlinks and interactive simulations. They found that when multimedia is used to reduce the cognitive load, establish a learning community and increase engagement, students' performance is affected because they perceive the course positively. To enhance this, it is crucial to have a clear organisation of the course (e.g., weekly topics format), presentation of expectations and an ongoing teacher's social presence by providing example answers in the assignments, allowing students to resubmit exercises, scaffolding them. Resources, multimedia and interface shaped to fit the needs of students with disabilities could also minimise the digital divide (Trout & Vela, 2016).

Some basic elements to consider for the overall course design are the structure, presentation of content, interaction and provision of timely feedback (Lister, 2014). It is vital to have a clear structure of the course while communicating the expectations with rubrics and examples of assignments. Authentic learning activities and self-assessment opportunities are needed for the content presentation. For collaboration, learner-instructor interaction can be promoted. For instance, additional face-to-face sessions can facilitate students' understanding (Trout & Vela, 2016).

Moreover, discussion-based activities where students are moderators of the ongoing dialogue provoke reciprocal interaction among them (P. Vlachopoulos et al., 2019). Discussions with open-ended questions are especially effective since learners can freely express themselves and participate actively. Finally, feedback should be constantly given, directly or indirectly, via technology tools while students' motivation is enhanced (Afifi & Alamri, 2014).

Online teaching practices and strategies

According to our research, 10 articles investigated the teaching practices and strategies deployed in distance education. Bolliger and Martin (2018) investigated the strategies that promote learners' engagement. They found that icebreaking, collaborative activities, students' presentations and peer-reviewed assignments can impact learner-to-learner engagement. Among the factors that enhance instructor-to-learner engagement were consistent announcements and reminders by email through the LMS, along with calling students by their names in discussions. However, students did not favour synchronous sessions, possibly due to their extracurricular responsibilities. Regarding learner-to-content engagement, authentic tasks (e.g., case studies, research papers) and discussions based on guided questions are effective strategies.

Since adult learners draw from their own experiences, the learning tasks should reflect real-life situations (Britt, 2015). The learner-centered approach can be enhanced when students design their pathways of learning (Courtney & Wilhoite-Mathews, 2015; Harris et al., 2020; Ritzhaupt et al., 2020), finding interpretations and solutions by investigating various resources over a period of time. Moreover, continuous assessment and reflection promote metacognition. In this context, Britt (2015) highlights that engagement does not rely on high-end technologies but adaptable pedagogies. Similarly, Rhim and Han (2020) emphasise the benefits of having experiential and hands-on learning, combined with synchronous and asynchronous sessions and an ongoing interaction in an established community of learning. These practices narrow down the transactional distance created by technology while encouraging learners to learn independently.

Constant connection is a key approach to engaging learners online (Bolliger & Martin. 2018). Specific strategies include early interventions (e.g., pre-assessment, development of students' readiness), continuous support and effective communication among all participants (Mulijana & Luo, 2019). Practitioners can establish social presence by choosing a balanced variety of activities, providing clear expectations or information and a safe, trustworthy and intimate environment (Mykota, 2018). While the course is running, the introductory activities should be welcoming (e.g., focused on orientation, guidance, self-introductions), and the instructors should model the expected behaviour by being present and responsive. Similarly, instructors can integrate discussion forums, synchronous sessions and ongoing feedback to maintain social presence, As a result, students who participate in a community perform better and are highly satisfied.

For this reason, instructors' social presence needs to be enhanced. According to Richardson et al. (2015), instructors undertake various online teaching roles. They support students and stimulate their participation and confidence. Additionally, they direct students in the discussions and the paths they follow, ensuring comprehension through scaffolding. Finally, they maintain organisation and structure, providing information about expectations and requirements while solving any issues that arise. These instructors' roles may involve a high or low level of social presence.

LMS and platforms: Strategies and structure

Four articles examined the role of the LMS and platforms in the learning experience's effectiveness, revealing the best strategies and structure practices. According to Cacheiro-Gonzalez et al. (2019), students are satisfied when a platform enhances their autonomy by providing easy access and navigation to instantly spot the information they need (Abuhassna et al., 2020). Effective platforms allow teachers to create a collaborative space (Liu et al., 2020). For example, specific tools such as web conferencing and forums can facilitate comprehension since students clarify misconceptions (Cacheiro-Gonzalez et al., 2019) through immediate feedback (Dlamini & Ndzinisa, 2020). Making announcements can also sustain asynchronous communication among participants (Dlamini & Ndzinisa, 2020). Such interaction is related to high levels of student satisfaction (Abuhassna et al., 2020).

Online platforms can also decrease feelings of loneliness derived from physical distancing and should be the medium to convey learning resources (Liu et al., 2020). The lessons can be delivered via various channels to promote accessibility (Dlamini & Ndzinisa, 2020) while students are tracking their progress and workload, for self-regulated learning; teachers are also aware of the progress to ensure the achievement of the learning goals (Dlamini & Ndzinisa, 2020; Liu et al., 2020). It is worth mentioning that students' positive prior experiences with a learning platform, and their acquisition of the skills to use it, relate to increased satisfaction (Abuhassna et al., 2020). Apart from designing and delivering activities, the LMS allows teachers to create and deliver assessments to provide feedback (Dlamini & Ndzinisa, 2020).

Quality of online course and instruction

Ensuring the quality of distance learning programmes is a continuous procedure across instruction design, development and delivery. Various models can be both a guidance and evaluation tool. Al-Fraihat et al. (2020) proposed a model to evaluate the effectiveness of distance education. It is focused on the idea that effectiveness and success are influenced by the level of participants' satisfaction, which in turn increases or decreases, based on external social factors (learners' and instructors' perceptions and support), the degree of quality (of information, technicalities, pedagogies and services), the extent of usability, accessibility and meaningfulness. The role of satisfaction is also evident in the research conducted by Hadullo et al. (2017). The findings show that the course development influences the quality of the online course (e.g., organisation, structure, layout, information), the type and degree of support provided to students, the technology integrated, the infrastructure and the institutional policies, the students' and instructors' profile, as well as the assessment implemented. These factors will impact participants' satisfaction, success and effectiveness in learning. Thus, measuring these will shape the quality of distance learning holistically. Similarly, support services by trustworthy staff ready to respond to students' needs and opportunities for physical communication (e.g., at institutional premises) that complement online presence relates to the way students perceive quality (Uppal et al., 2018). Additionally, platforms that are easy-to-use and navigate, provide content that promotes interaction, have a logical structure and are presented via multimodal channels positively impact the individuals' perspectives towards quality (Uppal et al., 2018).

Regarding guidelines, Martin et al. (2016) exploited the capabilities of learning analytics to measure the quality of online courses, following the Quality Matters standards. There are eight standards: course information and outline, statement of learning outcomes, assessment, materials/content aligned with the outcomes, technology that serves the achievement of the objectives, learners' access to support and overall course usability and accessibility. Martin et al. (2016) suggested that analytics can ensure these standards are followed: the digital footprint such as students' access, time spent on tasks and resources can be tracked and provide feedback for further investigation. However, instructors need to participate in training on following these standards and collaborating with a team of technology experts while they have enough time to engage with reflective practices for evaluation and course revision (Roehrs et al., 2013). This is in line with Eom and Ashill's (2018) recommendation on re-skilling instructors on learning design and/or development principles while ensuring their cooperation with those responsible for administrative issues such as the technology use, and the technical support provided. According to Karam et al. (2021), to ensure quality, specific support should be present: educators need training on how to apply innovative pedagogies in line with institutional affordances (e.g., specific tools such as an LMS) and, together with students, training on how to use the tools and platforms chosen actively. Technical aid in using the tools and various mediums is also needed. Therefore, support for teaching, learning and technical infrastructure are integral to preparing, designing, delivering courses and evaluating educators' practices.

Method

Data collection and research sample

The online survey examined the perceptions of a diverse group of online students that participated in an elective postgraduate course titled New Technologies, offered by the University of Nicosia, during the spring semester of 2021. A total of 21 students were enrolled in the course, which was part of the distance learning master's degree in education sciences, all of whom participated in the survey Having an interdisciplinary sample group allowed us to gather diverse opinions from students about online learning. In these terms, the underlying accessibility of convenient sampling allowed us to find participants interested in engaging with the course over a long period of time (Cohen et al., 2007), uncovering their opinions. An online questionnaire constituted the main data collection method employed in the research environment to gather qualitative and quantitative data. The questionnaire consisted of 19 closed-ended questions, including 4 questions related to the students' background and skills. Seventeen of the questions were formed in a 5-point Likert scale, measuring agreement and ability (1 corresponding to *strongly disagree* and 5 to *strongly agree*, or 1 corresponding to *extremely low* and 5 to *extremely high*), whereas the other two were dichotomous (1 corresponding to *no* and 2 to *yes*). The questions offered insights into students' perceptions and preferences when learning remotely, their opinions about the effectiveness of online course design and structure, teaching and assessment practices, and the LMS used.

To ensure that the questionnaire would yield results of a high degree of content validity, the questions were crafted in line with the topics that emerged from the systematic literature review. Additionally, Cronbach's alpha revealed that the results were of a high degree of reliability (0.876). This shows that the questionnaire has internal consistency, and the results can be considered reliable (Taber, 2018). Regarding the ethical issues, it is essential to state that the students completed relevant consent forms and participated in the research voluntarily. Anonymity, confidentiality and objectivity were maintained when collecting, analysing and presenting the results. Data were analysed using descriptive statistics, finding the means and standard deviation of the responses via the SPSS Statistics version 25.0 package. The questionnaire also included three open-ended questions that collected qualitative data. The disclosed patterns among the responses were identified through a detailed screening and thematic analysis. The main elements reported by the students were coded and grouped inductively under three main themes (see Table 3).

Online course design

The online course, offered through the Moodle LMS, was the main research environment. The course was redesigned before the spring semester of 2021 to become more interactive. The course was part of an accredited distance learning programme. It was elective and followed an instructor-led and self-paced mode: the learners studied weekly topics, which were unlocked progressively at the end of each week over a semester. The weekly topics included relevant content that learners studied on their own time (interactive presentations and articles) and weekly thought-provoking and creative activities, mainly discussions

facilitated via forums. Each learner presented their work in the forums while commenting on the work of at least two other classmates. The instructor provided individual and class-wide feedback upon completion of the weekly content and respective activities. The learners had to complete these activities by the end of the respective week to gain points contributing to their overall grade, along with two mid-term assignments (one group and one individual assignment). Completing the activities within a specific time frame also aimed to help learners stay on track. Finally, throughout the semester, there were three synchronous teleconferences to clarify concepts and present the individual mid-term assignment to exchange ideas. As mentioned above, the instructor was a guide on the side, always present to provide feedback (e.g., holding virtual meetings or chatting with students).

The technological tools employed were mainly those offered by Moodle, such as forums for weekly discussions, a database for students to share content creations (e.g., infographics) and a wiki for students to crowdsource resources they found for a specific topic. Other external tools were H5P to create various interactive activities (presentations, gap-filling, quizzes, videos with embedded questions to test understanding), Articulate Storyline 3 to create interactive, student-paced presentations with embedded quizzes, as well as Padlet to create a digital board where students shared ideas and opinions asynchronously or synchronously. Additionally, the students participated in polls and open-ended questions created with the Mentimeter tool, seeing each other's responses in real time. Moreover, the students debated and provided feedback (positive elements and recommendations) in group assignments via the Tricider tool. Finally, Webex was used for synchronous teleconferences. These tools were integrated into Moodle (e.g., as plugins) for usability purposes. In each case, the instructor could monitor learners' responses and progress, assessing them continuously while there were multiple types of interaction: between the learners; between the learners and the instructor; between the learners and the technology; and between the learners and the content. Finally, feedback was timely, from the instructor, the tool (preparation of feedback by the tutor in advance) or the other peers, depending on the learning needs.

Results

Quantitative data

The quantitative results are presented in Table 2, where the statements refer to the Likert-scale questions in the questionnaire. Based on the results, the 21 students' most preferred design aspects were the organisation of content (topic-based, weekly format) and the synchronous teleconferences. Sepcifically, the respondents agreed on average that the learning objectives were sufficiently presented (M = 4.286), the course was effectively organised into topics (M = 4.381), there was an adequate presentation of learning activities in each topic (M = 4.095) and the overall design increased their interest in the subject matter (M = 4.333). In terms of the educational content, they agreed that the teleconferences and the educational videos were of high quality regarding their content and technical features (M = 4.238 and M = 4.191, respectively). The interactive presentations (related to the weekly topic with short quizzes to check for understanding) were of high-quality content (M = 4.143). However, they were undecided as to whether the course load was equally distributed over the weeks (M = 3.429).

Table 2
Means and standard deviations of students' opinions regarding their skills and the online course (N = 21)

Statements	No.	Mean	SD
Evaluate your ICT and Internet skills	21	3.857	.793
Evaluate your skills in using virtual learning environments	19	3.789	.713
Evaluate your digital competence to attend the course	21	3.857	.964
Learning objectives were adequately and in-detail presented	21	4.286	.717
Course content was appropriately organised in topics	21	4.381	.805
There was an adequate presentation of learning activities on each topic	21	4.095	.944
The overall design increased my interest in the subject	21	4.333	.577
Course load was equally distributed during the semester	21	3.429	.810
I prefer more interaction with the course content through formative assessment	21	4.048	.805
I prefer more collaboration through group work activities	21	2.810	.981
Videos were of high quality in terms of content	21	4.191	.749
Teleconferences were appropriate in terms of content and quality	21	4.238	.700
Presentations were effective in terms of content	21	4.143	.793
The platform was easy to use	21	4.476	.512
It was easy to familiarise myself with the platform due to its structure	21	4.429	.676

The structure of the course (divided into topic-based weekly content with specific starting and ending dates) was adequate for my learning needs	21	4.095	.539
I needed help navigating the platform	21	2.381	1.499

Qualitative data

Regarding the qualitative data, the questionnaire consisted of the following three open-ended questions:

(1) What facilitated your learning concerning the course structure, the presentation of the learning material, and the use of interactive technologies? (coded as "Facilitation")
(2) What was the most challenging issue for you in terms of the course structure of the course, the presentation of the learning material, and the use of interactive technologies? (coded as "Challenges")
(3) Which course elements (e.g., platform structure, educational material, video lectures, activities/assignments, etc.) were the most useful for you? (coded as "Useful elements")

All 21 students expressed their opinions. We grouped students' responses into larger themes based on the frequency of certain elements they noted. As a result, Table 3 presents which elements the students reported as a means for facilitation, as challenging issues and as the most useful for their studies. Many students (n = 7) identified the interactive presentation of the learning material (i.e., weekly interactive presentations, quizzes, interactive videos) as the most important element for the facilitation of learning. The learning content per se (i.e., asynchronous material) was also reported to be helpful to the learners' studies (n = 13). Some students (n = 3) considered the interactive tools (i.e., Articulate Storyline 3, wikis, Padlet) as practical elements, too. Among the most challenging issues, though, was the difficulty of using digital tools (n = 8).

Table 3
Students' opinions about the elements of learning facilitation, challenges and usefulness (N = 21)

Facilitation	**No.**
Presentation of content	7
Interactive tools	3
Organisation of course	2
Structure of platform	2
Formative assessment	2
Guidance handbook	1
Challenges	
Use of digital tools	8
Wiki ool	2
Deadlines	2
Guidance and instructions	2
Activities	2
Useful elements	
Learning content	13
Video lectures	5
Activities	6
Collaboration	1
Teacher's presence	1

Discussion

Comparing the results of the systematic literature review and the online survey, the findings answer both research questions: which learning design elements the online students seem to prefer and which factors indicate the quality of online learning. First, most students stated that they need to be aware of the learning objectives of the course they attend. This agrees with the literature, where the learning design frameworks highlight the importance of defining clear and measurable outcomes the learners will achieve upon completion of a course (Baldwin et al., 2018; D'Agustino, 2012; McGahan, 2018; Robinson & Wizer, 2016) so that the content and the activities will be aligned with them (Afifi & Alamri, 2014). Our research indicates that it is important to communicate these learning outcomes and the expectations regarding activities and assessment directly to students (David & Frederick, 2020; Lister, 2014; Mykota, 2018; Richardson et al., 2015). For this reason, a course guide can assist them when they prepare to study.

Additionally, most students agreed that they need online courses with a clear organisation and structure; content divided into weekly topics, presented in manageable chunks, and weekly activities or assessments aligned with the respective goals of the unit. Other researchers also reported the benefits of this structuring in facilitating comprehension (Baldwin et al., 2018; David & Frederic, 2020; Heilporn & Desrochers, 2020; Ng & Baharom, 2018). This serves scaffolding (D'Agustino, 2012) while providing consistency (Soffer & Nachmias, 2018). In this context, incorporating formative assessment weekly, mediated by appropriate tools, seems to increase interaction and facilitate understanding. Ongoing assessment can be achieved through various forms (e.g., interactive quizzes) with constructive feedback (Kuzmanović et al., 2019). In our research, though, most students preferred to be engaged with an equal workload across the weeks (e.g., the same number of tasks) without having strict deadlines for task completion. For this reason, learners could be provided with adequate autonomy and control of what, when and where they learn (Sorgengrei & Smolnik, 2016) since adults prefer self-regulated learning (Squires, 2018). However, learners' characteristics affect the degree of autonomy needed (Sorgengrei & Smolnik, 2016). Well-defined structure, layouts, authentic information, resources and multimodality can be used as quality indicators (Al-Fraihat et al., 2020; Hadullo et al., 2017, Uppal et al., 2018).

Furthermore, the sample students preferred collaborative activities throughout the online course. This finding agrees with the literature where adequate peer-to-peer interaction, guided by the instructor, can establish an online community to facilitate co-construction of knowledge and enhance satisfaction (Abuhassna et al., 2020; Kuzmanović et al., 2019; Lee et al., 2019, Ng & Baharom, 2018; Shonfeld, 2021). Activities that strengthen this kind of interaction are student-moderated discussions, where participants engage in a dialogue on topics that are open to interpretations (P. Vlachopoulos et al., 2019). Additional group work can include presentations or peer-reviewed tasks where students provide feedback (Bolliger & Martin, 2018). It is worth mentioning that some students prefer individual assessment over collaborative (Heilporn & Desrochers, 2020), possibly due to the difficulties related to online or distant coordination.

Regarding the learning material, most students favoured interactive, authentic and high-quality content (in terms of content and technical features), covering the learning outcomes. Similarly, researchers have highlighted that interactive material enhanced by audiovisual elements (e.g., images, text, hyperlinks, interactive simulations, embedded media, presentations, videos) may increase students' engagement (Adanır et al., 2020; Topal, 2016) and performance (David & Frederick, 2020). Authentic content can be drawn from real-life experiences, with specific examples, directing students towards the active application of knowledge to develop skills relevant to their academic and professional fields (Bolliger & Martin, 2018; Britt, 2015; Rhim & Han, 2020; Ritzhaupt et al., 2020; Sugar & Luterbach, 2016; Trespalacios & Lowenthal, 2019). It is important, though, to follow a differentiated instruction, by adapting the resources to fit students' distinctive traits and abilities (Sugar & Luterbach, 2016; Trout & Vela, 2016), such as modifying the interface for learners in need of support.

According to the sample students, the role of instructors is multifaceted; their constant presence, guidance, facilitation, management, clear instructions, scaffolding and support are all much needed. This agrees with the results from the literature, according to which instructors should interact with students via synchronous and asynchronous means (Bolliger & Martin, 2018; Heilporn & Desrochers, 2020) and provide adequate instructions and feedback (Afifi & Alamri, 2014; Ng & Baharom, 2018); additional face-to-face support can have a positive impact on learners' comprehension (Trout & Vela, 2016). In our research, students found the teleconferencing sessions especially useful. This contradicts Bolliger and Martin's (2018) finding that students did not prefer these sessions because they were time-restricting. Other factors such as timing, scheduling and frequency may affect students' perceptions. Regardless, the aim should facilitate a safe online environment for expression and creativity (Mykota, 2018). To ensure quality, instructors should develop skills across all the roles they assume through appropriate training and collaboration with experts (Eom & Ashill, 2018; Roehrs et al., 2013), while technical and pedagogical support is provided both to them and the learners (Hadullo et al., 2017; Karam et al., 2021; Squires, 2018; Uppal et al., 2018).

Regarding technology, most students prefer platforms and tools that are easy to use and navigate, provide clear guidance (e.g., gradual content unlocking) and are interactive. On the one hand, tools must ensure access to content while enhancing learners' flexibility to participate individually, their autonomy and self-control of learning (Cacheiro-Gonzalez et al., 2019; Dlamini & Ndzinisa, 2020; Liu et al., 2020; Squires, 2018). On the other hand, a collaborative space must promote seamless interaction (Adanır et al., 2020; Dlamini & Ndzinisa, 2020; Squires, 2018). In our current research, students commented that using new

tools might be challenging. Similarly, students tend to prefer using familiar technologies or be comfortable enough before using new ones (Trespalacios & Lowenthal, 2019), while their satisfaction is correlated with the extent to which they have acquired the skills needed to use a tool (Abuhassna et al., 2020). Selecting appropriate technology and ensuring its usability, accessibility, and meaningfulness can be an online learning quality indicator (Al-Fraihat et al., 2020; Hadullo et al., 2017). Learning analytics is an effective tool that can be used to evaluate whether the quality standards have been followed by tracking the digital footprint left after each participant's activity (Martin et al., 2016; McGahan, 2018), prompting further refurbishments.

Implications and recommendations for practice

Based on the findings, there are specific recommendations for the learning design approach and quality of online learning. The learning design principles can be grouped into four broad areas. The first area refers to the course structure and organisation. We suggest that online courses be well organised to offer consistency and engage students. The content can be organised into topics, preferably divided into weekly chunks, which will be progressively unlocked. At the beginning of the course and subsequent units or topics, instructors should communicate the learning outcomes to students, showing them what is expected to learn.

Additionally, the workload should be spread equally throughout the semester, without deadlines that are too restrictive, while providing students with autonomy and self-control. The second area refers to the learning material per se. We strongly recommend to enhance the content with interactive activities and formative assessments (e.g., reflective quizzes) in line with the learning outcomes that have been set. This also includes promoting student-moderated discussions, where participants engage in a dialogue on topics open to interpretation. Furthermore, the third area refers to the interaction in the online context. We suggest that students can interact and moderately collaborate with their peers in online assignments which balance group and individual work without emphasising one type over the other. Appropriate tools should mediate individuals' communication and enhance interactivity in the online platform. Lastly, the fourth area refers to guidance and support. It is vital that instructors offer ongoing support to students, such as guidance and feedback on learning and using new technologies. This also includes guiding students' cooperation with one another and providing clarifications, directions and consultation while managing and facilitating the learning process. In these terms, though, the chosen platform must be easy to access, use and navigate for students to participate in the online course effectively.

Regardless of the above elements that can be used as guidance when (re)designing courses, five factors emerged as determinants of the quality of the online courses. The first indicator refers to the appearance, of course, its structure and organisation. Specifically, clear structures and layouts, coherent information and resources provided in a consistent way across all sections of a course are prioritised. The second indicator relates to the authenticity of the learning content. Emphasis is put on including practical, authentic material with experience-based examples and tasks. The third indicator concerns interaction and presentation. The high degree of interactivity and multimodality of the material is of utmost importance. The fourth indicator refers to the appropriateness of the technology. The technology must be usable, accessible, and meaningfully integrated. Lastly, the fifth indicator is the degree of support provided. This relates to the fact that support on technical and pedagogical issues should be provided to students and teachers to work in an online context smoothly.

Conclusion

The research results can be a guide for a wide range of university practitioners in the digital learning era. It is suggested that practitioners such as learning designers, developers and instructors focus on creating interactive, multimodal and inclusive courses that are clearly and consistently structured, with practically oriented material that can be easily accessed through technology. In this context, we recommend the enhanced presence of instructors and support teams to promote students' self-regulated learning. It is worth mentioning that our research is not free of caveats. The small size of respondents restricts the generalisation of the results to the whole population. However, future studies could draw from the research process and findings, examining university students' perceptions on a larger scale over two consecutive academic semesters. It would also be interesting to investigate the way personalisation of online learning can be

achieved, considering the suggested learning design principles. This includes examining whether the personalised approach affects learning outcomes or feelings of satisfaction and engagement. Finally, gamification elements offered by various LMSs, such as levels and badges, could be incorporated into the online courses, in line with the suggested learning design principles, to investigate their impact on learning effectiveness.

Availability of data and materials

The datasets used and/or analysed during the study are available from the corresponding author on reasonable request.

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