

Review

An Interdisciplinary Scoping Review of Sustainable E-Learning within Human Resources Higher Education Provision

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Abstract: Background: This paper has identified a gap in the extant Human Resource higher education literature in relation to the use of sustainable e-learning pedagogy. As such, a scoping review has been undertaken to draw conclusions to help narrow this gap. This review is timely, given the rise in e-Human Resource practices in organisations. Introduction: For Human Resource e-learning to be truly sustainable, consideration also needs to be given to the broader driving forces impacting its long-term viability in university provision. The objectives of this paper are focused on exploring the interdisciplinary nature of the context, challenges, benefits, and future directions of sustainable e-learning in tertiary education. Design: the methodological design is based upon the PRISMA extension for scoping reviews. Discussion: this scoping review also considers the emerging e-learning sustainability issues at the university level to determine if a full systematic literature review would be beneficial in the long term. Conclusions: this paper offers conclusions to support Human Resource researchers and educators who wish to push the boundaries of sustainable e-learning research. Future Direction: this paper also points to the speed of advances in AI and the need to move from a uni-generational to a multi-generational sustainable e-learning focus.

Keywords: e-learning human resource education provision; sustainable e-learning; tertiary education; e-learning; e-learning quality assurance; AI e-learning; university support for e-learning; e-learning and student perceptions; online learning; digital learning; desituated e-learning



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1. Introduction

As higher education institutions (HEIs) seek to diversify their income streams amid unprecedented competition for students and ever-challenging funding opportunities post-pandemic [1], it is timely that a review of the extant e-learning literature and the future sustainability of the specialist field of Human Resources (HR) provision within tertiary education is considered. Significantly, this paper seeks to contribute to the academic debate surrounding the viability and relevance of e-learning Human Resources in the future for both the higher education (HE) sector, students, academics, and the economy. As such, this paper seeks, in part, to assist researchers in pushing the boundaries beyond a COVID-19 lens to aid the long-term e-learning sustainability of Human Resource higher education (HRHE) provision. But this paper also seeks to make a significant contribution to identifying the depth and complexities that exist within the e-learning HRHE field, which must be understood if sustainable e-learning provision is to be future-proofed for the next generation of e-learners and stakeholders. This review suggests that the current state of the wider field of sustainable e-learning in tertiary education is robust but also that the niche area of HRHE sustainable e-learning would benefit from expansion and greater levels of quality research. This paper also determines that the sustainable e-learning field of practice is facing a wide range of emerging themes—some in the form of barriers and others in the form of opportunities. For example, how to sustain e-learning through equitable and accessible technology strategies, rapid AI and digital advances, and contextual issues (including HE institutional responsibilities in relation to e-learning quality assurance);

through to employer support for e-learning academics; and through appreciation of the e-learning needs of students from diverse socio-demographic backgrounds. The controversial aspect arising within this review is the divergent lexicon of terms that shrouds this field and calls for greater uniformity in both the pedagogical and methodological aspects if the field is to be developed robustly for the future. While the divergent hypotheses emerging in the literature range from (a) the transformative need to “reimagine” not “replicate” our tertiary e-learning institutions to (b) a social conscious and creative perspective towards decolonising the e-learning curriculum [2,3].

1.1. Defining Sustainable E-Learning

According to Ref. [4], e-learning is a “technology-mediated learning approach” that offers great opportunity to educationalists. In turn, sustainability within an education context [4] is concerned with addressing current learning and the development needs of learners whilst remaining a viable mode for future learning needs. Of note in Ref. [5], twenty-three terms associated with e-learning were identified, all of which can be broadly distinguished based on whether they focus upon systems or communication through “computer assisted instruction”, as distinct from solely human or physical in-person instruction. While in Ref. [6], there is an emphasis on how e-learning can include both a system and platform to aid accessible learning, which should include related materials and a degree of support for users.

1.2. Contributions and Shortcoming of Previous Systematic Literature Reviews on Sustainable E-Learning

This section seeks to consider the previous systematic literature reviews (SLRs) within the e-learning field. While this paper considers a scoping review instead, the analyses of previous SLRs were considered necessary to help determine the extent of the literature gap within the area of HRHE e-learning provision.

The authors of Ref. [4] offer a significant contribution to the field of sustainable e-learning in their SLR, through the authors’ analysis of published research from 2008 to 2019. The latter study offers clarity on the definition of sustainable e-learning, helping to illuminate the plethora of terms that exist within the field as well as the related myths that have surrounded e-learning. In particular, the study helps to clarify the evolution of e-learning as well as the most common theories adopted within e-learning research between 2008 and 2019, including community of inquiry theory. In addition, the SLR study offers further clarity about the types of “modalities” considered within the research, with MOOCs considered to be the most common. But in terms of the limitations of this SLR [4], it does not focus upon specialist areas of business tertiary education, such as Human Resources.

The SLR examined within Ref. [7] provides a useful adjunct to the earlier SLR provided within Ref. [4] by placing a useful emphasis upon a range of quality aspects considered to be necessary if e-learning is to remain sustainable within academic education. To that end, the SLR in Ref. [7] highlights a greater range of models emerging within the e-learning literature including the technology acceptance model, SERVQUAL, E-learning Quality model (EQL), as well as the e-learner satisfaction model. The authors [7] also identified a detailed list of constructs across the extant e-learning literature, including information, system, users, learners, instructors, stakeholders, course design, multimedia, interactions, reliability, responsiveness, user interface, as well as factors impacting the e-learning user, e.g., satisfaction, grade expectations, benefits, systems use, and adoption. But again, this SLR [7] does not focus upon the specialist field of HRHE provision.

While the SLR undertaken in Ref. [6] is also pre-COVID-19, it does offer some interesting contributions to the sustainable e-learning field, including the range of factors that the authors consider important if e-learning is to be sustainable, including human, social, technical, and environmental sustainability dimensions. However, the SLR is limited in that the dimensions are more akin to an external environmental analysis, which is not fully explored within the review. In addition, the SLR moves into the area of “green”

environmental factors, which is not clearly expanded upon. Lastly, a further limitation is in the more historical aspect of the review given that it covers the period from 2005 to 2017.

The SLR put forward in Ref. [8], while offering useful considerations specific to a higher education e-learning context, (including internal e-learning sustainability issues as well as governmental responsibility), is country-specific. A further limitation is the range of terminology used within the SLR.

The review considered in Ref. [9] makes a useful contribution to the HEI debate on sustainable e-learning and also presents the findings of empirical research. But the SLR is limited as the study also focuses on private and not just public HEI contexts in relation to sustainable e-learning approaches that, as suggested here, skews the findings given that each type of HEI has a very different funding model. The SLR offered in Ref. [10] has a useful focus upon grey literature, which offers some relevance to the wider sustainable e-learning debate. However, it is considered the review would have been strengthened considerably had there been a greater emphasis upon peer-reviewed journal articles within the SLR. The SLR put forwarded in Ref. [11], however, offers a baseline academic discussion on the topic of sustainable e-learning and its genesis. While it also articulates HR- and business-related issues, such as resource management, professional development, and education attainment, more detail is required in relation to the search strings. A summary of these previous SLRs and their shortcomings is provided within Tables 1 and 2 below.

Table 1. Summary of previous SLR and their shortcomings.

Previous SLRs	Key Themes	Shortcomings
Ref. [4]	Definition of e-learning	Not specific to HR
	Identification of common myths	Pre-COVID-19
	Review of research over a decade	
	Identification of the most common theories and modalities	
Ref. [6]	Sustainability meta-requirements	Pre-COVID-19
	e-learning systems	Engineering Focus
	e-learning sustainability checklist	Timeline 2005–2017
Ref. [7]		Greenability Not HR-specific
	e-learning service framework	Not specific to HR
	Sustainability via systems COVID-19 as a global driver	Range of E-learner users examined is too broad
Ref. [8]	A range of quality determinants	
	Range of e-learning models	
	4-dimensional conceptual model	
	International dimensions Academic context Institutional responsibilities Key stakeholders	Range of terms Not HR-specific

1.3. Motivations for This Work

The HR function is the specialist and often niche area of business, which is responsible for the people aspect of organisational work, covering every stage of the employment journey from recruitment and selection to performance but also including the learning and development of staff. With the world of work having changed considerably in recent years, global trends indicate the ongoing popularity of working from home and/or hybrid working, e.g., in the UK between 2022 and January 2023, 16% of the working population reported working from home, while 28% reported a combination of home and travel to work, with the latter most likely to be those educated to degree standard [12]. The results of a survey examining global homeworking trends, in Ref. [13], found that 29% of respondents

were working permanently from home and 36% were working in a hybrid form. There is the parallel dependency too on effective e-learning platforms, processes, and procedures to support this contemporary change in the world of work and HR [14]. However, the preliminary search of the literature undertaken as part of this study has pointed to a dearth of quality research into sustainable e-learning across HRHE provision. The fact that this gap in the literature exists is significant given that HRHE prepares graduates for roles in personnel/HR departments within organisational contexts, globally. Given the rise in e-learning approaches across HR, it is considered vital that university HR graduates are prepared effectively for the HR employment settings, they will find themselves in Ref. [14]. As such, this study puts forward the case that for HR graduates to be fully prepared to embrace the e-learning aspect of contemporary work, the higher education provision, through which they achieve their tertiary HR qualifications, needs to be built upon sustainable HRHE e-learning, in part.

Table 2. Continued: summary of previous SLRs and their shortcomings.

Previous SLRs	Key Themes	Shortcomings
Ref. [9]	Higher Education Academic Business Discipline Change Management	Country-Specific Private/Public HE
Ref. [10]	Industry-Focused Grey Literature	Lacks Jnl. Articles Data
Ref. [11]	Concept of Sustainability Origins of Sustainability Educational Context Education Attainment Resource Management Professional Development	Pre-COVID-19 Broad Spectrum Search Strings

A further motivation for this work is the accredited nature of HRHE provision, whereby most HR third-level qualifications in the UK (and increasingly internationally) are accredited by the professional body of the HR profession—the Chartered Institute of Personnel and Development (CIPD). As such, HR graduates are required to not only meet the academic attainment standards of their HR university degree but also the professional standards set by the CIPD. Indeed, leaders in graduate careers [15] advocate for both a degree qualification and one that is accredited by the CIPD, given that many employers see both requirements as good indicators of a graduate’s ability to perform within an HR business setting. There is too, the increase in e-HR. However, not all HR professionals are embracing this trend [16]. Indeed, it is emphasised that there is more to be completed within the HR field if it is to embrace digitisation to support its administrative responsibility. The HR profession is also seeing a rise in popularity of e-recruitment; virtual panel interviews; e-performance reviews; as well as increases in e-learning and development practices within organisations. All of which are considered to be more effective and efficient in meeting the training and development needs of increasingly remote employees as opposed to costly in-person training and development. As the e-learning aspect of the HR profession develops, it is considered that the content of tertiary HR provision, on which the HR profession is dependent, needs to also reflect these e-learning development. To do so effectively, this paper considers that contemporary e-HRHE provision needs to be shaped through quality research-led pedagogy.

However, before embarking upon this scoping review, it was unclear what information was available in the extant literature relating to sustainable e-learning within HRHE provision, what it entails, as well as the benefits, challenges, and future directions within this specialist academic area of business education. Nor was it clear whether e-learning HRHE is sufficiently sustainable to support HR graduates seeking a career within the HR profession after they qualify from their university HR degree. For this reason, both a preliminary

literature review and an interdisciplinary scoping review were conducted. This helped to map research undertaken in the area; to identify knowledge gaps by examining sustainable e-learning issues across a range of disciplines; and to draw informed conclusions to benefit current and future HR academics and researchers wishing to contribute to the health of sustainable e-learning research within the HRHE field.

1.4. The Main Contributions of This Work

Having considered both a preliminary literature search as well as examining previous SLRs across the interdisciplinary field of sustainable e-learning in HR university provision, the following are the main contributions of this paper:

- As a contribution to the literature gap in the field of sustainable e-learning HR tertiary provision;
- As an aid to new and upcoming researchers within the discipline of HR higher education provision, who wish to study and expand the research into the contemporary state of sustainable e-learning within HR higher education across the university sector, globally;
- As reference point for more established academic researchers in the field;
- As a contemporary overview of the complexity of the sustainable e-learning HR tertiary provision—encompassing benefits, challenges, and future directions.

1.5. Aim, Research Question, and Objectives

The aim of this scoping review is to determine the sustainable e-learning research themes emerging within HRHE provision. As such, this scoping review seeks to contribute to the long-term sustainability of e-learning HRHE that is not solely focused upon COVID-19 influences but which focuses instead upon the viability of HRHE through the use of e-learning. Therefore, the research question is as follows:

- What is known about sustainable e-learning HRHE provision within the literature in terms of themes, benefits, challenges, and future directions?

The objectives of this review are as follows:

- Identify the sustainable e-learning research themes within the HR- and interdisciplinary-related literature;
- Examine the most common contexts within which sustainable e-learning tertiary education is being undertaken more widely in the interdisciplinary literature, given the gaps in the HRHE e-learning literature;
- Provide a baseline for other researchers wishing to contribute to and expand the research into sustainable e-learning, within the specialist field of HRHE provision;
- To determine whether there is a case for undertaking a systematic literature review in the future in order to expand the results of this scoping review.

2. Review of Methodology

2.1. Philosophical Position

The philosophical approach within which this paper is situated is pragmatism, drawing upon the epistemological perspective that acceptable knowledge is heavily dependent upon the research question. The related ontological perspective is one where external and multiple sources are used to identify information that aligns to the research question. As such, the role of the researcher is of vital importance in this process. The axiological perspective emphasises the importance of values in interpreting the results with both objective and subjective points of view being applied, Ref. [17].

2.2. PRISMA Extension for Scoping Reviews

The PRISMA extension for scoping reviews (ScR), Ref. [18], has been applied within this paper. Each stage of the PRISMA extension will now be considered, where appropriate, starting with the checklist.

2.3. The PRISMA-ScR Checklist

The first step in this process was completion of the PRISMA-SCR checklist, which was adapted for this study as follows (Table 3):

Table 3. Checklist adapted from PRISMA-ScR and applied within this review.

Item	Descriptor
Review of Methodology	Protocol
	Preliminary Literature Search
	Scoping Review
	- Eligibility Criteria
	- Information Sources
	- Search Terms
	Selection of sources of evidence
	Prisma Flow Chart
	Data Charting Process (Preliminary Search)—Categories and Units
	Data Charting Process (Scoping Review)—Categories and Units
	- Data Items
	Critical Appraisal of Individual Sources of Evidence
Results	Synthesis of Results
	Selection of Sources of Evidence
	Characteristics of Sources of Evidence
	- Percentage of Publications by database
	- Percentage of Articles Review by database
	- Themes—Preliminary Search
Discussions	- Themes—Scoping Review
	Critical Appraisal Within Sources of Evidence
	Results of Individual Sources of Evidence
	Discussion
Funding	- Preliminary Search
	- Scoping Review
	Summary of Evidence
	Limitations
	Conclusions
	Future Directions
	Funding

Sources: adapted from Ref. [18].

The checklist has been helpful in providing an initial structure for the paper as well as a basis for drawing up the PRISMA-SCR protocol.

2.4. The PRISMA-ScR Protocol Framework

The PRISMA-ScR protocol developed for this paper is included in Table 4 below and seeks to outline the scope of the review.

Table 4. The protocol framework.

Review Title and Timescales	
Review Title:	Sustaining e-learning: the current landscape and future direction within Human Resources Higher Education. An interdisciplinary scoping review
Start Date	April 2023
Anticipated Completion Date	TBC as article is still under review
Stage of Review at the Time of this Submission	Preliminary searches: COMPLETED
	Search results: COMPLETED
	Formal screening via eligibility criteria: COMPLETED
	Data extraction: COMPLETED
	Risk bias (quality) assessment: COMPLETED
	Data analysis: COMPLETED
Preliminary Search	HR and e-learning; defining e-learning/e-learning and higher education; technology-enabled e-learning; new technologies and e-learning; BYOD; distance learning; generational e-learning; virtual and augmented reality; online assessment; online presence; digital exclusion; challenges and e-learning; defining e-learning/e-learning and the economy/desituated learning; accessible e-learning; working from home; screen time; sustainable e-learning design
Inclusion Criteria	Adults/students/employees over 18
Exclusion Criteria	Primary/secondary-level education; COVID-19 commissioned study
Screening of search results	Completed
Risk of Bias Statement	Not applicable
Data Analysis	Completed
Reviewer Details	
Reviewer Contact Details:	As per the author's contact details for this article
Affiliated HE Institution:	As per the author's employer HEI details for this article
Funding Sources:	No funding has been sought for this work nor has this work been commissioned
Conflict of Interests	The author has no conflicts of interest to declare
Review Methods	
Review Question:	What is known about sustainable e-learning Human Resource higher education provision within the literature in terms of themes, benefits, challenges, and future directions?
Literature Search	A preliminary search was undertaken using the most common business databases available within the library catalogue of the author's employing university. This included Business Source Premier and JSTOR. Grey literature was also considered in this preliminary search and was sourced from a wide range of HR/business sources, which can be more difficult to identify, e.g., CIPD.org.uk; IATED.org/ICERi/; Google Scholar; and MERLOT. Following analysis of the preliminary search results, the more extensive scoping literature review was undertaken using EBESCO (including Business Source Premier and ERIC), Emerald, and Science Direct. Some more specific HR journals were also considered including the Journal of Human Resource Management and the International Journal of Human Resource Management.
Domain Being Studied	The scoping review seeks to examine the extent to which research into sustainable e-learning in Human Resources higher education is being undertaken and the related contexts, benefits, challenges, and future directions.
Participants/Population	This work is concerned with studies/SLR/scoping reviews focused upon e-learning among adults within an HR HEI and/or employment context.
Interventions/Exposure	Not applicable as this scoping review is primarily concerned with peer-reviewed articles and grey literature involving business reports/scholarly articles. No social media, blogs, and/or video blogs are being used in this scoping review.
Comparator/Controls	Any comparator is relevant for inclusion including higher-education-institute-related studies whether specific to Human Resource education provision or other business/education-specific provision. Also, this applies to any comparator study focusing upon sustainable e-learning among adults/students over 18 years of age, irrespective of context.

Table 4. Cont.

Review Title and Timescales	
Types of Study to be Included Initially	All types of publications are to be included, e.g., published articles, articles in conference proceedings, editorial websites, chapters in textbooks, and business reports.
Context	All periods of time are eligible—excluding studies with a major focus on COVID-19-related sustainable e-learning.
Primary Outcomes	The broad categories of outcomes anticipated within this study include the following: the extent to which research into sustainable e-learning HRHE is being undertaken within the field of HR and/or business-related disciplines. It is anticipated that there is a lack of such research, and as such, it is expected reliance will need to be placed upon an interdisciplinary body of work as it related to sustainable e-learning within a range of business and education disciplines as well as sustainable e-learning within organisations.
Secondary Outcomes	Not applicable.
Data Extraction (Selection and Coding)	As there is no one standard/agreed approach to analysing qualitative data in Ref. [17], a generic approach to analysis will be applied within the PRISMA-ScR protocol. This generic analysis will allow for a structured approach to the categorisation of themes. It is considered this will lend itself to the deductive nature of this study, given the use of existing secondary data/articles/reports, etc. [17,19]. As this is a scoping review and not an SLR/meta-analysis, data extraction has not relied on software and instead upon a thematic analysis of articles, using document summaries [17,19]. The extraction will draw upon the 5 principles put forward in Ref. [17], which are as follows: 1. Comprehend large and disparate forms of qualitative data; 2. Integrate related data from different texts and notes; 3. Identify key themes and patterns for further exploration; 4. Develop theories based upon these patterns and themes; 5. Draw conclusions. Following these guiding principles and building upon the work of Miles and Huberman (1994) [20] regarding “data reduction”, the following interim steps are applied: The first step will be identification of categories arising from the literature—attach meaning to each category by applying a “name”—formally referred to as a “code” or “label”. Each code/label provides the initial “structure” of the data extraction. The identification of the categories will be dictated by the research question and objectives. As such, this keeps with the philosophical positioning of this study. As this is a scoping review, categories will be “concept driven” from the literature, e.g., from theory within the literature as recommended in Ref. [17]. As the categories (codes/labels) are added, a well-structured analytical framework develops. This analytical framework then aids the analysis of the data extraction stage. According to the author of Ref. [21], categories require two dimensions—they must be (a) meaningful to the data from which they were generated and (b) be meaningful to the other categories. Next step: Units To aid the extraction, each category needs to have a “unit” of data attached to it. As this is a scoping review, units can be words/phrases or abbreviations from the literature but must relate to the categories. Categories and units can be placed in the margins of extracts from the literature or placed in a separate document with details of the page number/line number to which they relate in each piece of the literature, in Ref. [22]. For the purposes of transparency and to minimise bias, extracts of both approaches are made available within this study. This results in data being presented in a more useful and manageable way [17].
Strategy for Data Synthesis	Following the establishment of categories and units, a vertical hierarchical data extraction table will be used to illustrate the categories and units against each study. This is intended to aid the reporting of data for this ScR.
Analysis of Sub-groups or Sub-sets	Not applicable.

Table 4. Cont.

Review Title and Timescales	
Risk of Bias (Quality Assessment)	It is acknowledged this scoping review is being undertaken by one author only, which can lead to subjective bias. However, care is being taken to minimise such bias through the use of the PRISMA-ScR protocol to aid transparency. As this is a scoping review and not a systematic literature review, the point is raised that any future development of this study will consider inclusion of more than one reviewer to minimise bias further.
Type of Review—Select One of the Following: • Scoping Review • SLR • Rapid Review • Other Language Country URL for Publication of Protocol	Scoping Review. English UK and International No URL: Author’s email address—protocol provided on request
Dissemination Plans	If this study passes the review stage, it is hoped that approval will be given for publication in the MDPI Journal Special Issue—Sustainable E-Learning Practices.
Key Words	e-learning; sustainable e-learning; tertiary education and e-learning; e-learning quality assurance; AI and e-learning; university support for e-learning; e-learning and student perceptions; online learning; digital learning; desituated e-learning
Details of Other Existing Protocols on the Same Topic by the Same Author	None/not applicable
Current Review Status	Ongoing
Any Additional Information	Not applicable
Details of Final Report/Publication	Not applicable—review still in progress.

Sources: Table 4—adapted from Ref. [18].

As this paper is authored by a sole reviewer, no other reviewers were involved in sense checking the protocol. However, the author’s academic, research, and professional experience in the education and practice of HRHE provision have informed this process. This point will be revisited in the limitations section of this paper.

2.5. Preliminary Literature Search

Firstly, a preliminary search of peer-reviewed articles and grey literature was undertaken to determine if an initial gap could be identified within the e-learning HR literature. It was considered this would provide an early indication of the scope of the review to be undertaken. It is also considered this would benefit researchers and scholars in the interdisciplinary field of e-learning and HRHE. This preliminary search was influenced by the author’s own scholarly expertise and professional experience in the Human Resource higher education and e-learning fields and included searches of databases and grey literature sources in both the e-learning and HRHE fields. It is acknowledged there is a high degree of risk to bias in such a subjective preliminary search of peer-reviewed and grey literature, and as such, an approach may result in a limited set of results that does not present a sound indication of the field being reviewed. However, the case is made that the author’s own research in e-learning and HRHE had indicated a sizeable gap in the extant literature, and this preliminary search endorsed this. This preliminary search also sought to gauge whether publications in this search were still heavily laden with COVID-19-esque research or whether there was any early indication that published sustainable e-learning HRHE research was transforming into a distinct area of study within this specialist area of business higher education—free of COVID-19 influences. The results of the preliminary search indicted that while the literature is still heavily laden with COVID-19 publications, there are early indications of a growing creative body of publications that appear to point

to the niche area of sustainable e-learning in HRHE, which would benefit from a scoping review (ScR).

Tables 5 and 6, below, illustrate the search terms and databases used and the number of related publications that the preliminary search yielded. This preliminary search included academic and grey materials to reflect not just academic research but also the professional and accredited nature of some HRHE provision. The exclusion criteria that applied to the preliminary search were (a) any article/publication that did not include the exact search terms and (b) articles that included COVID-19 in the title.

Table 5. Preliminary search results—databases.

Period of Searches	Databases and Search Terms	No. of Results
June–August 2023	Business Source Premier	3
	JSTOR	28
	Search terms: HR and e-learning; defining e-learning/e-learning and higher education; technology-enabled e-learning; new technologies and e-learning; BYOD; distance learning; generational e-learning; virtual and augmented reality; online assessment; online presence; digital exclusion; challenges and e-learning	

Source: developed by the author.

Table 6. Preliminary search results—grey literature.

Period of Searches	Grey Literature and Search Terms	No. of Results
June–August 2023	CIPD: sustainable e-learning	ChatGPT 3
	AI: evidenced-based learning	hybrid working
	Google Scholar:	
	Defining e-learning/e-learning and the economy/desituated learning; accessible e-learning; working from home; screen time	9
	MERLOT: sustainable e-learning design	1

Source: developed by the author.

The following Tables 7 and 8, below, provide a more concise overview of the search terms for the preliminary database search, i.e., Tables 7 and 8 provide a further overview of the search terms used to identify appropriate grey literature that aligns with the research question and the objectives of this paper.

Table 7. Search terms—preliminary database search.

Search Terms: Preliminary Search Databases	
1	HR and e-learning
2	Defining e-learning
3	e-learning and higher education
4	Technology enabled e-learning
5	New technologies and e-learning
6	Bring Your Own Device (BYOD)
7	Distance learning
8	Generational e-learning
9	Virtual and augmented reality
10	Online assessment
11	Online presence
12	Digital exclusion
13	Challenges and e-learning

Sources: adapted by the author.

Table 8. Search terms—grey literature.

	Search Items: Preliminary Search Grey Literature
1	E-learning and the economy
2	Desituated learning
3	Accessible e-learning
4	Working from home
5	Screen time

Sources: adapted by the author.

The preliminary search included searches of Business Source Premier and JSTOR. In addition, the preliminary search also included searches for more niche and specialist documents relating to HRHE and HR teaching and scholarly papers. As such, the preliminary search also included searches for grey materials from the following: the professional HR body the CIPD as well as one of the main European conference publication sources—International Academy of Technology, Education and Development (IATED); Google Scholar; and the Multimedia Education Resource for Learning and Online Teaching (MERLOT).

The preliminary search indicated that there was a complex array of themes arising within the publications identified. The search also indicated that e-learning within higher education provision is influenced by a range of interdisciplinary fields including IT; arts and creativity through the theme of online desituated learning space; economic data on homeworking trends; and social-intergenerational data. As such, the preliminary search and subsequent analysis provided results, which were used to inform the decision to undertake an ScR.

2.6. Scoping Review

Following the preliminary search, the steps within the PRISMA-ScR protocol were followed.

Eligibility Criteria: To be included in the scoping review, papers were identified that focused upon an aspect of e-learning among adults aged 18 years of age either within a higher education context or an employment setting. Any paper where the primary focus of the study was as a result of the COVID-19 pandemic was ruled out. That is, if COVID-19 was mentioned in the title, the paper was removed from the study. There is, however, recognition that because of the significance of the COVID-19 pandemic on education, most papers published since then have some reference to the pandemic contained within them. In such cases, those papers have been retained within the study.

Information Sources: To identify relevant papers, the most popular business databases were searched in the period from April 2023 to mid-August 2023. Following the analysis of the preliminary search results, the more extensive scoping literature review was undertaken using EBESCO (including Business Source Premier and ERIC), Emerald, and Science Direct.

Search Terms: The following Table 9 is offered to provide details of the search items used within this scoping review. All of the searches using HR/business databases were accessed using the library catalogue available to the author at their employing HE institution.

2.6.1. Selection of Sources of Evidence

The selection of the source evidence has been informed by the author's research and the author's professional experience and awareness of the ongoing changes and advancements within the HR profession. In addition, the results of the preliminary search have also guided the direction of more detailed search of the literature undertaken in the scoping review. As this was a scoping review and not a full SLR, no other authors/reviewers were involved in this study. This point is referred to again in the limitations section of this paper.

Table 9. Scoping review search terms and related details.

Date Range	Search Terms	Database
August 2023	Content, type, article: sustainable e-learning	Business Source Premier
August 2023	e-learning and systematic lit review and higher education	(EBESCO) ERIC
August 2023	(content-type: article) e-learning systematic review	Emerald
August 2023	(content-type: article) AND (title: “e-learning” AND (title: “sustainable”) AND (abstract: “systematic literature review”))	Emerald
August 2023	(content-type: article) AND (title: “higher education” AND (title: “e-learning”) AND (abstract: “systematic review”))	Emerald
August 2023	(content-type: article) AND (title: “Human Resource” AND (title: “e-learning”) AND (title: “systematic literature review”))	Emerald
August 2023	(content-type: article) AND (title: “Human Resource” AND (title: “E-learning”) AND (title: “sustainable”) AND (title: “Education”))	Emerald
August 2023	(content-type: article) AND (title: “Human Resources” AND (title: “Higher Education”) AND (title: “e-learning”) AND (abstract: “sustainable”))	Emerald
August 2023	e-learning (TI) sustainable (Ab Abstract); Higher education (Ab Abstract Abs); systematic review (TI)	EBESCO Host Business Source Premier—Human Resource Management Journal
August 2023	e-learning (TI) systematic review (TI)	EBESCO Host Business Source Premier—Int Journal of Human Resource Management J
August 2023	e-learning (TI) systematic literature review (AB Abstract)	EBESCO Business Source Premier and ERIC databases
August 2023	e-learning (TI) systematic literature review (AB Abstract)	MDPI SLRs
August 2023	e-learning (TI) systematic literature review (AB Abstract)	Science Direct

Source of table contents: adapted by the author.

2.6.2. PRISMA—Flowchart to Identify Publications and Reports Included within the SCR

Using the PRISMA-ScR extension, the following flowchart (Figure 1) indicates the number of publications searched for, screened, and included in this study.

2.6.3. Data Charting Process (Categories and Units)

As there is no one standard/agreed approach to analysing qualitative data [17], a generic approach to analysis will be applied within the PRISMA-ScR protocol. This generic analysis will allow for a structured approach to the categorisation of themes. It is considered this will lend itself to the deductive nature of this study, given the use of existing secondary data/articles/reports, etc. [17,19]. As this is a scoping review and not a SLR/meta-analysis, data extraction has not relied on software and instead upon a thematic analysis of articles, using document summaries [17,19]. The extraction will draw upon the five principles put forward in [17], which are as follows:

1. Comprehend large and disparate forms of qualitative data;
2. Integrate related data from different texts and notes;
3. Identify key themes and patterns for further exploration;
4. Develop theories based upon these patterns and themes;
5. Draw conclusions.

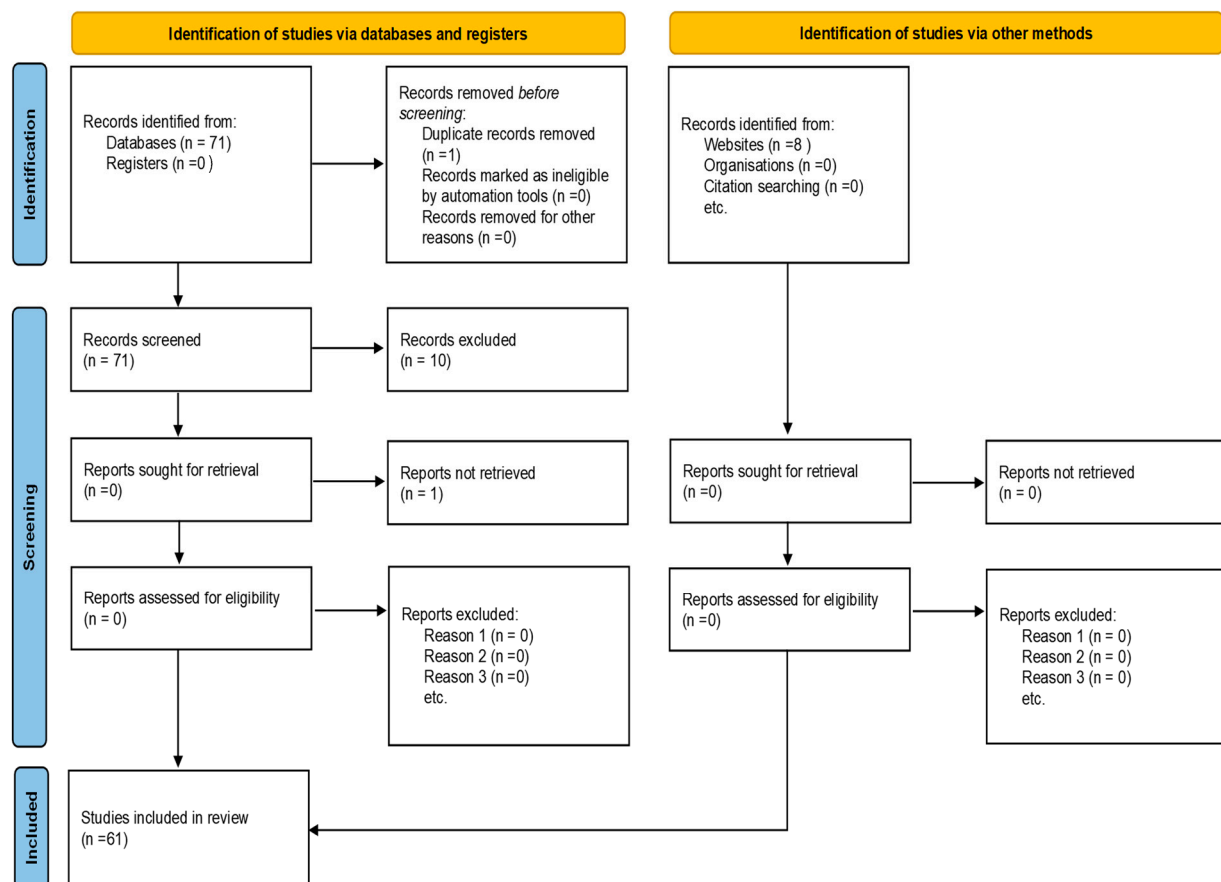


Figure 1. The number of publications identified, screened, and included within the study. Source: adapted from [18].

Following these guiding principles and building upon the work of the authors in Ref. [23] regarding “data reduction”, the following interim steps are applied:

The first step will be identification of themes/categories arising from the literature. That is, meaning will be attached to each theme by applying a “name”—formally referred to as a “code” or “label”. Each code/label provides the initial “structure” for the data extraction. The identification of the categories will be dictated by the research question and objectives. As such this is in keeping with the philosophical positioning of this study. As this is a scoping review, categories will be concept driven from the literature. Ref. [17], e.g., from theory within the literature. As the categories (codes/labels) are added, a well-structured analytical framework develops. This analytical framework then aids the analysis of the data extraction stage. According to Ref. [21], categories require two dimensions—they must be (a) meaningful to the data from which they were generated and (b) be meaningful to the other categories.

2.6.4. Units

To aid the extraction, each theme needs to have a “unit” of data attached to it. As this is a scoping review, units can be words/phrases or abbreviations from the literature but must relate to the themes. Themes and units can be placed in the margins of articles. Alternatively, they can be placed in a separate document with details of the page number/line number to which they relate in each piece of the literature, Ref. [22]. For the purposes of this study coding (themes/units/sub-categories and codes) were recorded in the margins of the articles being reviewed. It was considered this approach was both efficient and aided transparency. This results in data being presented in a more useful and manageable way [17]. The following table (Table 10) provides an overview of the data charting process in the preliminary search through the application of the guidelines offered in [23].

Table 10. Data charting process—preliminary search.

Themes/Category	Unit	Sub-Category	Code
Terminology	Term	Distance learning	Term-DL
		Remote learning	Term-RL
		Online learning	Term-OL
		e-learning	Term-EL
		Procedural	Term-Proc
		Construct	Term-Const
Technology	Tech	Access, equity, space, quality assurance,	Tech-Access
		economic/socio-demographics	Tech-Equity
		User expectations	Tech-space
		Complexity	Tech-qual-assur
		Bring Your Own Device	Tech-econ
		Place and place settings	Tech-sociodem
		Interdisciplinary—art and design	Tech-user-Expec
		Systems	Tech-compl
		Infrastructure	Tech-BYOD
		Screen time	Tech-place-sett
			Tech-Interdisc-Art-des
			Tech-Infra
e-learning	EL		Tech-Scr-T
			EL-space
			EL-pres
		Space and presence	EL-platf
		Platforms	EL-Pract-mirr
		Practice mirroring	EL-mater
		Materials	EL-Desitu-Spc
		Desituated space	EL-Sync
		Synchronous/a-synchronous	EL-A-Sync
		Access	EL-Acc
		Equity and fairness	EL-Equ-Fair
		Generational	EL-Gen
		International perspectives	EL-Int-Persp
		QA	EL-QA
Artificial Intelligence	AI		EL-Int-persp
			EL-QA
		Artificial Intelligence	AI-AI
		Augmented reality	AI-Aug-R
		Virtual reality	AI-V-R
		ChatGPT	AI-Chat
		HE sector	AI-HE-Sec
		Student confidentiality	AI-Stud-confi
		Ethics	AI-Ethics
		Staff proficiency	EI-Staff-Prof
		Procurement	AI-Proc
		Algorithm accountability	AI-Algor
		Teaching possibilities	AI-Acc
		Platforms	AI-Teach-Poss
Institutional Responsibilities	IntsR		AI-Plat
		Contractual—staff and student	InstR-Cont-Staff
		Place of work	InstR-Cont-Stud
		Place of study	InstR-Pl-o-Wk
		Remote work/study	InstR-Pl-o-Std
		Wellbeing	InstR-WellB

Sources: adapted by the author.

The following Table 11 illustrates the same approach (themes/units/sub-categories and codes) applied within the scoping review. Please note that this has been informed by the preliminary search.

Table 11. Data Charting Process—Scoping Review.

Themes/Category	Label	Sub-Category	Code
HE students—undergraduate, postgraduate, and Ph.D.	HE-S-UG-PG-PhD	In full-time employment Part-time study Learning quality Structure and organisation of Materials Communication tools Teaching expertise Motivating skills, Learning e-activities Societal impact	HE-S-FT-E HE-S-PT-S LQ HE-S-Materials-HE-S-Struct- Org HE-S-Comms-tools HE-S-T-E HE-S-Mot-S HE-S-Learn-E-Act HE-S-Soc-t-Impt
E-learning and gamification	E-L-GameF	Intergenerational Design principles Individual tailoring	EL-GameF-Inter-G Des-P Ind-Tayl
Pedagogical design of e-learning	EL-Ped-Des	Content and process scaffolding Learner adaptability	EL-GameF-Cont-Scaf Proc-Scaff L-Adap
Principle-based e-learning	Princ-B-E-L	Gamification and motivation Block-chain technology Parameters Resources Infrastructure	Princ-B-E-L-GamF-Motv Bloc-C-Tech Param Res Infa-S
Sustainable e-learning benefits	Sust-E-L-Ben	Assessment quality	Sust-E-L-Ben-Assmt-Q
e-learning content	E-L-Cont	Learning experiences Appropriate platforms Feedback Instructor–student communication	E-L-Cont-L-Exp App-Plat Feed-B Inst-Stu-Comms
e-learning as an evolution of distance learning	E-L-Ev-Dist-L	Affective computing Intelligent tutoring systems Emotional intelligence	E-L-Ev-Dist-L-Aff-Compt I-T-S E-I
e-learning quality assurance Framework	E-L-Qual-Ass-F	Cost effectiveness Distance learning component Quality assurance criteria	E-L-Qual-Ass-F-C-E D-L-C Qual-Ass-C
e-learning measurement and intervention tools	E-L-M E-L-I	Self-directed learning Challenges	E-L-M-I-S-D-L Chall
Platforms and e-learning assessments	PlatF-E-L-LA	Student satisfaction Senior faculty responsibility	PlatF-E-L-LA Stud-Satf Snr Fac-R
e-learning assessments	E-L-A	Assessment administration Assessment design	E-L-A-A-Admin A-D
e-learning theories	E-L-Th	Community of inquiry Technological acceptance model	E-L-Th-Comm-Inq Tech-Acc-M
e-learning study and employment	E-L-Stdy-Empl	Viable alternative to in-person teaching	E-L-Stdy-Empl-V-A-In-Pers-T

Sources: adapted by the author.

2.6.5. Data Items

The data is primarily qualitative in nature and was extracted based upon the characteristics of each article, e.g., the salient themes/categories presented in each article, both in terms of any primary research undertaken and those arising from the discussion within each article—as they related to the research question. As such, data that fell across a range of categories was identified, e.g., some relating to knowledge, procedure, attitudes, and contractual/workplace matters, while some are HEI-specific.

2.6.6. Critical Appraisal of Individual Sources of Evidence

Given the research questions and objectives of this report, it was considered important that as many themes as possible were identified to provide depth to the analysis and aid the identification of a meaningful set of conclusions. As this is not a full systematic literature review, it was not considered necessary to apply a specific tool/software at this point. Instead, it was considered important that as much analysis as possible was undertaken manually. This has helped to identify the extent of the research and scholarly work that remains to be done in the field of e-learning HRHE provision, if it is to remain sustainable in the future. In addition, the preliminary search of the literature revealed there was a gap in published works pertaining directly to sustainable e-learning within the HRHE provision. As such, it was considered necessary to undertake an interdisciplinary scoping review to draw a deeper level of conclusions to aid current and future HRHE researchers. From there, it was decided to use the data to ascertain whether a systematic literature review should be undertaken in any future expansion of this study. The latter point will be revisited in the final stages of this paper.

2.6.7. Synthesis of Results

The preliminary search results provided the baseline of this scoping review as it indicated that much more work needed to be done to expand the level of quality research within the field of sustainable e-learning, given that so few HRHE-specific publications exist on how sustainable e-learning is advancing within this specialist field. This preliminary search also provided useful data that indicated the complex range of categories that exist within the sustainable e-learning HRHE field, which suggests that HEIs need to consider if this specialist area of e-learning HR education provision is to move beyond a COVID-19-esque response only.

While this was a scoping review, it was considered that there were so few scoping reviews available, which aligned with the focus of this paper, that it would be more relevant to focus upon the systematic literature reviews within the interdisciplinary field of e-learning and HRHE provision. It was also considered that related SLRs would provide a greater level of detail to support the conclusion and future direction sections of this paper. As such, the search focused upon SLR publications that were aligned to the research question. It was also considered that the analysis of this literature was the most effective way to (a) determine if there was an endorsement of the categories identified in the earlier preliminary search, (b) to embrace the interdisciplinary nature of this study more effectively, and to (c) aid the sub-categorisation of articles within the SLRs to align them more effectively to the research questions. It was also considered this would be the most effective way to help support the case for an SLR of the sustainable HRHE and related interdisciplinary e-learning fields in the future—should anyone wish to expand this study.

3. Results Section

The results of the scoping review will now be presented, using the following structure applied. Firstly, the publications which have been reviewed will be presented by publication year and then by databases/source information. Next the data relating to the themes and sub-categories which were identified in the review will also be considered both within the preliminary search and within the more detailed scoping review.

3.1. Selection of Sources of Evidence

The studies and published works were considered by first identifying how specific the title was to HR and/or HE provision, e.g., by identifying if e-learning and/or sustainable e-learning were included in the title or abstract. From there, a preliminary search was undertaken, which included sources specific to the HR profession, e.g., the CIPD website, as well as specific HR business journals and Google Scholar. This helped inform the scoping review in terms of more specific search criteria as well as a broader range of databases to aid the interdisciplinary aspect of this paper. While this paper has been a scoping review, it has sought to ascertain whether a systematic literature review in the future would be of use to the HRHE sustainable e-learning field. As such, the previous systematic literature reviews pertaining to HR and/or HE provision in the area of sustainable e-learning were considered (Table 12).

Table 12. Selection of Sources of Evidence.

Date	Search Terms	Database	No. of Articles	Excluded	Included	Notes	Ref.
August 2023	Content, type, article: sustainable e-learning	Business Source Premier	2	1 (mentioned COVID)	1		Ref. [20]
August 2023	e-learning and systematic lit review and higher education	(EBESCO) ERIC	2	0	2		Ref. [24]
August 2023							Ref. [25]
		Emerald	3	1	2	One article excluded as SLR/SR not mentioned in title nor abstract	Ref. [26]
							2nd article not accessible
August 2023	(content-type: article) e-learning systematic review	Emerald	2	1	1		Ref. [27]
August 2023	(content-type: article) AND (title: "e-learning" AND (title: "sustainable") AND (abstract: "systematic literature review"))	Emerald	1	0	1		Ref. [28]
August 2023	(content-type: article) AND (title: "higher education" AND (title: "e-learning") AND (abstract: "systematic review	Emerald	1	1 (as SLR quoted not applied to the article)	0		N/A
August 2023	(content-type: article) AND (title: "Human Resource" AND (title: "e-learning") AND (title: "systematic literature review"))	Emerald	0	0	0		
August 2023	(content-type: article) AND (title: "Human Resource" AND (title: "E-learning") AND (title: "sustainable") AND (title: "Education"))	Emerald	0	0	0		

Table 12. Cont.

Date	Search Terms	Database	No. of Articles	Excluded	Included	Notes	Ref.
August 2023	(content-type: article) AND (title: "Human Resources" AND (title: "Higher Education") AND (title: "e-learning") AND (abstract: "sustainable"))	Emerald	0	0	0		
August 2023	e-learning (TI) sustainable (Ab Abstract); Higher education (Ab Abstract Abs); systematic review (TI)	EBESCO Host Business Source Premier— Human Resource Management Journal	0	0	0		
August 2023	e-learning (TI) systematic review (TI)	EBESCO Host Business Source Premier—Int Journal of Human Resource Management J	2	1 (case-study-specific, not SLR)	1		Ref. [29]
August 2023	e-learning (TI) systematic literature review (AB Abstract)	EBESCO Business Source Premier and ERIC databases	13		7	5, e.g., 1 (as K-12 children specific); 1 as case study and not purely SLR; 1 as COVID-19 specific; 1 duplicate article already included in this SLR; 1 was a conference proceeding review.	Ref. [30]
August 2023						Duplication	Ref. [24]
August 2023							Ref. [31]
August 2023							Ref. [32]
August 2023							Ref. [33]
August 2023							Ref. [34]
August 2023							Uses "general lit review not a SLR" Ref. [35]
August 2023							Ref. [36]
August 2023		MDPI SLRs					Ref. [4]
August 2023		Science Direct					Ref. [20]

3.2. Characteristics of Sources of Evidence

The following figure (Figure 2) provides a representation of the characteristics of the literature considered within the review, as a percentage breakdown by year of publication. The results show that the majority of articles/reports considered within this review were published between 2019 and 2023, inclusive. The remaining articles considered had a publication date that fell on or between 2005 and 2018, inclusive.

3.3. Percentage of Publications by Database

Next, the results of the percentage of articles reviewed in each database/source of the articles will be presented. Firstly, the results of the preliminary search will be shown in Figure 3, followed by the percentage of articles by databases from the scoping review shown in Figure 4.

3.4. Themes: Preliminary Search

Next, the distribution of themes across the range of articles was considered. Firstly, the results from the distribution of themes by percentage of articles is shown from the preliminary search in Figure 5.

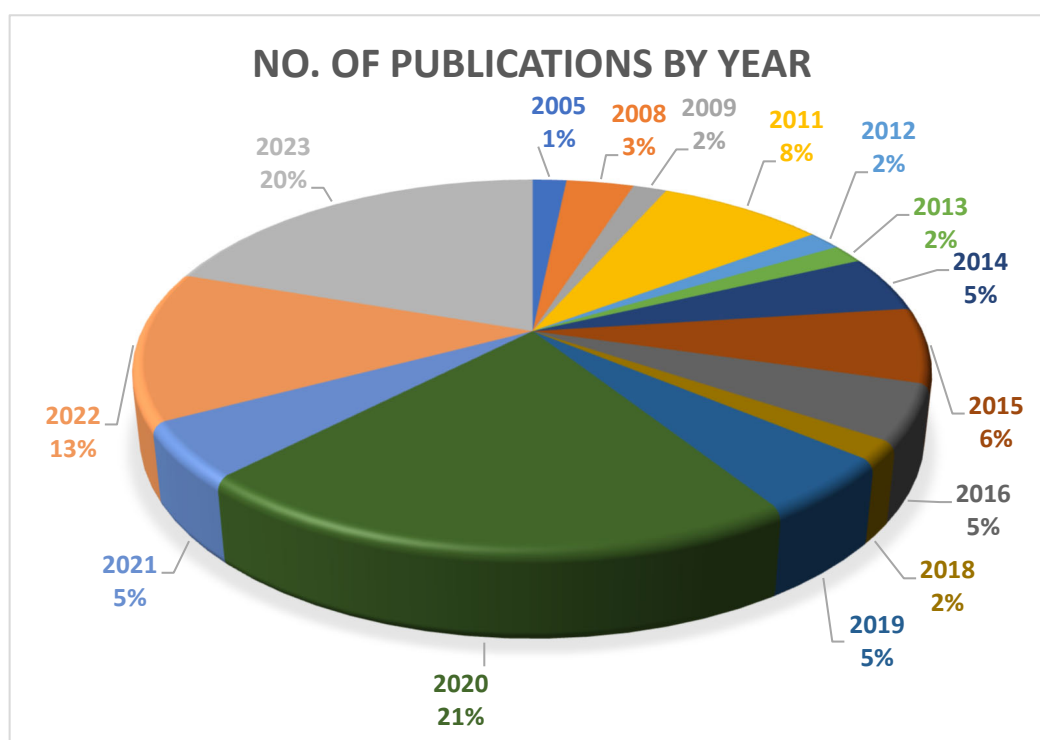


Figure 2. Publications Reviewed by Year: Preliminary Search and Scoping Review. N = 61.

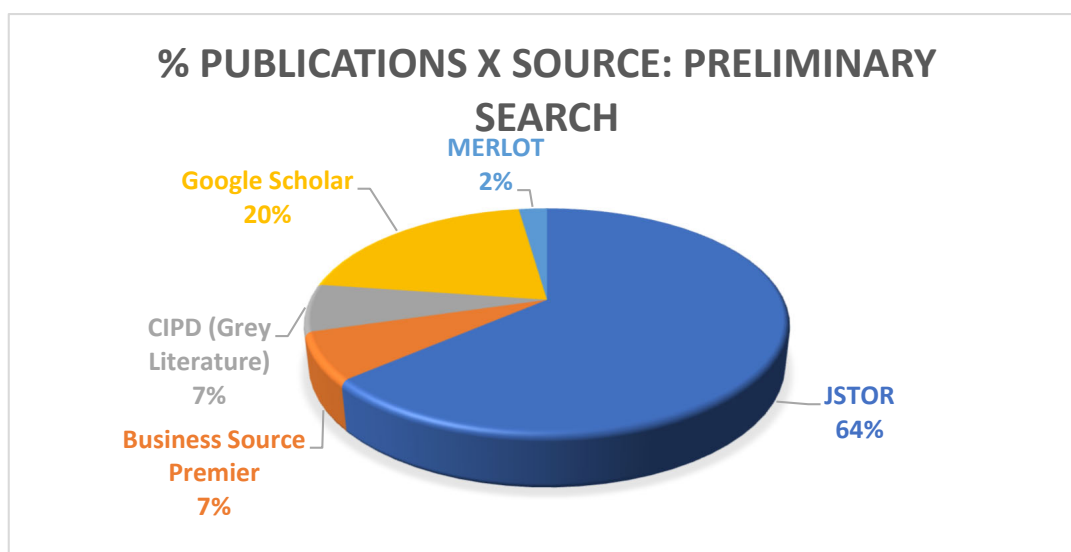


Figure 3. Preliminary Search: Percentage of Publications Review × Source/Database.

As expected, the range of themes identified within the scoping review publications increased considerably. In some cases, publications revealed an overlap of the additional themes. As such, Figure 5 depicts the range of themes that emerged following the scoping review. (A fuller breakdown of the scoping review themes $\times$ articles is presented in Figure 6, below).

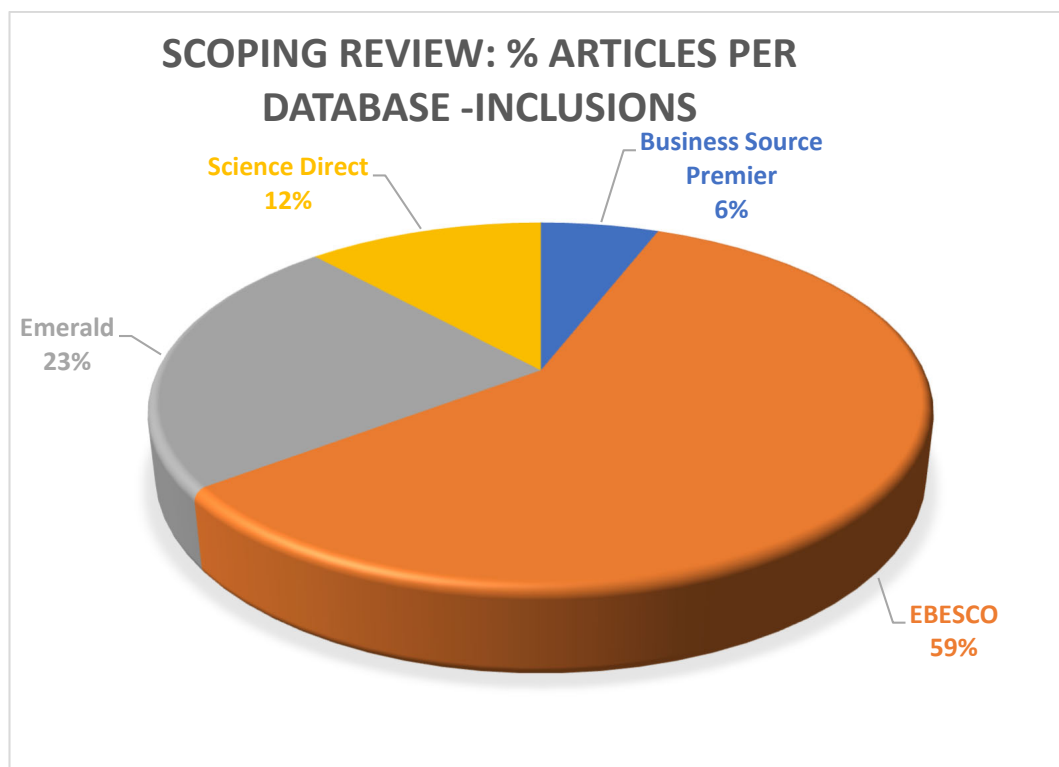


Figure 4. Scoping Review: Percentage of Articles Reviewed Per Database (Inclusions).

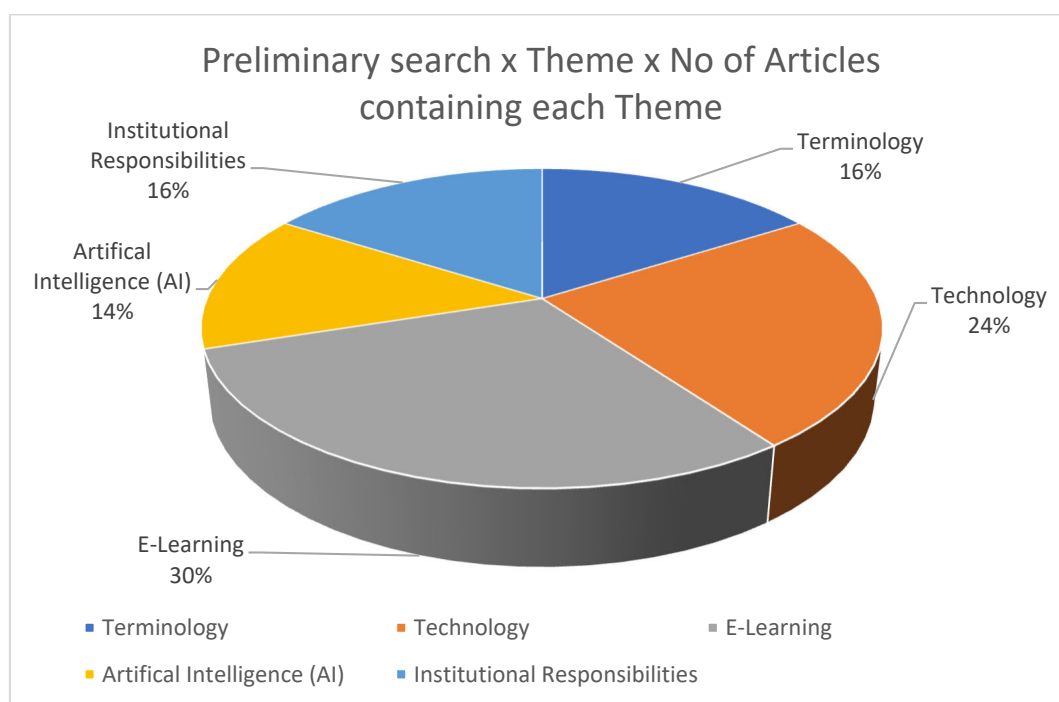


Figure 5. Preliminary search $\times$ Theme $\times$ Number of articles containing each theme.



Figure 6. Themes: Scoping Review.

3.5. Critical Appraisal within Sources of Evidence

An in-depth assessment of the themes arising in each publication was then undertaken. The literature gap within the HRHE provision extant literature, in relation to sustainable e-learning practices, had been identified. As such, the aim of this scoping review was to identify as many themes as possible from the interdisciplinary HE literature in relation to sustainable e-learning, which could aid HRHE researchers in developing the specialist discipline of HRHE e-learning sustainable provision. A detailed identification of the sub-categories of each theme was also undertaken. No software was used in this analysis; instead, coding of the text in each article was undertaken manually, using the theme/category and unit approach recommended in Ref. [21].

3.6. Results of Individual Sources of Evidence and Synthesis

The results of the individual sources of evidence are depicted in the table below by mapping the themes, units, and related coding against each reference considered in the preliminary search and scoping review. Firstly, Table 13 depicts the results of the individual sources of evidence from the preliminary search.

Continuing with the identification of individual sources, the following Table 14 depicts the themes $\times$ labels $\times$ sub-category $\times$ unit, within the scoping review.

Please note: As this was an ScR and not an SLR, the aim was to identify themes and sub-categories. The focus of this study was not to identify types of knowledge nor to compare the methodological design of each publication included in the review.

Table 13. Individual source $\times$ theme $\times$ label $\times$ sub-category and code—preliminary search.

Themes/Category	Label	Sub-Category	Code	Source
Terminology	Term	Distance learning Remote learning Online learning e-learning Procedural Construct	Term-DL Term-RL Term-OL Term-EL Term-Proc Term-Const	Refs. [5,25,37–42]
Technology	Tech	Access, equity, space, quality assurance, economic/socio- demographics User expectations Complexity Bring Your Own Device Place and place settings Interdisciplinary—art and design Systems Infrastructure Screen time	Tech-Access Tech-Equity Tech-space Tech-qual-assur Tech-econ Tech-sociodem Tech-user-Expec Tech-compl Tech-BYOD Tech-place-sett Tech-Interdisc-Art- des Tech-Infa Tech-Scr-T	Refs. [2,25,40,43–51]
e-learning	EL	Space and presence Platforms Practice mirroring Materials Desituated space Synchronous/a- synchronous access Equity and fairness Generational International perspectives QA	EL-space EL-pres EL-platf EL-Pract-mirr EL-mater EL-Desitu-Spc EL-Sync EL-A-Sync EL-Acc EL-Equ-Fair EL-Gen EL-Int-Persp EL-QA EL-Int-persp EL-QA	Refs. [2,42,51–60]
Artificial Intelligence	AI	Artificial Intelligence Augmented reality Virtual reality ChatGPT HE sector Student confidentiality Ethics Staff proficiency Procurement Algorithm accountability Teaching possibilities Platforms	AI-AI AI-Aug-R AI-V-R AI-Chat AI-HE-Sec AI-Stud-confi AI-Ethics EI-Staff-Prof AI-Proc AI-Algor AI-Acc AI-Teach-Poss AI-Plat	Refs. [44–50]
Institutional Responsibilities	IntsR	Contractual—staff and student Place of work Place of study Remote work/study Wellbeing	InstR-Cont-Staff InstR-Cont-Stud InstR-Pl-o-Wk InstR-Pl-o-Std InstR-WellB	Refs. [42,44,51,61–65]

Table 14. Themes × labels × sub-category × unit, within the scoping review.

Themes/Category	Label	Sub-Category	Code	Source
HE students—undergraduate, postgraduate, and Ph.D.	HE-S-UG-PG-PhD	In full-time employment Part-time study Learning quality Structure and organisation of materials Communication tools Teaching expertise Motivating skills, learning e-activities Societal impact	HE-S-FT-E HE-S-PT-S LQ HE-S-Materials-HE-S-Struct-Org HE-S-Comms-tools HE-S-T-E HE-S-Mot-S HE-S-Learn—E-Act HE-S-Soct-Impt	Ref. [20]
E-learning and gamification	E-L-GameF	Intergenerational Design principles Individual tailoring	EL-GameF-Inter-G Des-P Ind-Tayl	Ref. [66]
Pedagogical design of e-learning	EL-Ped-Des	Content and process scaffolding Learner adaptability	EL-GameF-Cont-Scaf Proc-Scaf L-Adap	Ref. [25]
Principle-based e-learning	Princ-B-E-L	Gamification and motivation Block-chain technology Parameters Resources Infrastructure	Princ-B-E-L-GamF-Motv Bloc-C-Tech Param Res Infa-S	Ref. [26]
Sustainable e-learning benefits	Sust-E-L-Ben	Assessment Quality	Sust-E-L-Ben-Assmt-Q	Ref. [28]
e-learning content	E-L-Cont	Learning experiences Appropriate platforms Feedback Instructor–student communication	E-L-Cont-L-Exp App-Plat Feed-b Inst-Stu-Comms	Ref. [29]
e-learning as an evolution of distance learning	E-L-Ev-Dist-L	Affective computing Intelligent tutoring systems Emotional intelligence	E-L-Ev-Dist-L-Aff-Compt I-T-S E-I	Ref. [30]
e-learning quality assurance framework	E-L-Qual-Ass-F	Cost effectiveness Distance learning component Quality assurance criteria	E-L-Qual-Ass-F-C-E D-L-C Qual-Ass-C	Ref. [31].

Table 14. *Cont.*

Themes/Category	Label	Sub-Category	Code	Source
e-learning measurement and intervention tools	E-L-M E-L-I	Self-directed learning Challenges	E-L-M-S-D-L Chall	Ref. [32]
Platforms and e-learning assessments	PlatF-E-L-LA	Student satisfaction Senior faculty responsibility	PlatF-E-L-LA Stud-Satf Snr Fac-R	Ref. [33]
e-learning assessments	E-L-A	Assessment administration Assessment design	E-L-A-A-Admin A-D	Ref. [35]
e-learning theories	E-L-Th	Community of inquiry Technological acceptance model	E-L-Th-Comm-Inq Tech-Acc-M	Ref. [4]
e-learning study and employment	E-L-Stdy-Empl	Viable alternative to in-person teaching	E-L-Stdy-Empl-V-A-In-Pers-T	Ref. [20]

4. Discussion

This discussion and subsequent sections seek to address the research question outlined at the start of this paper—namely, “what is known about sustainable e-learning HRHE provision within the literature in terms of themes, benefits, challenges, and future directions?”. A discussion of the preliminary search will be presented in the first instance, followed by a discussion of the literature identified in the SCR.

4.1. Preliminary Search—Discussion

The academic literature terrain of e-learning is broad, deep, and interdisciplinary. To ensure a niche and relevant systematic academic review, and given the volume of research available for consideration, the search terms used maintained a primary focus upon tertiary e-learning education. Online learning was also a prominent search term given how frequently it is used interchangeably with e-learning, across the extant literature, albeit with synchronous/asynchronous nuances. Other terms such as digital learning, distance learning, remote learning, hybrid, and blended learning were only included in this review where the search returned literature from a higher education (HE) context and where there was a clear reliance upon e-learning technology to deliver the learning provision. As such, recurring themes were taken as an indication of prevalence and dominance within the e-learning literature field. Attention has also been paid to themes that have begun to emerge within the field, recently. For example, AI and augmented reality, while not yet dominating the e-learning literature field, have been included here due to the rapid advancement of AI technology and to the populist ethical and moral responses to AI emerging across media platforms, which in turn, have fuelled academic as well as private debates on the long-term consequences of such technology. From there, themes were categorised to provide a more coherent structure to this paper, as follows.

4.1.1. Terminology

Ref. [25] posits that e-learning is part art and part science, encompassing both application and theory. Ref. [5] echoes this interdisciplinary view, indicating that no one definition of e-learning exists that will satisfy all disciplines within HE. Further complexity arises when one considers that existing definitions of e-learning draw upon a wider lexicon of terms, such as e-learning as distance learning using an electronic medium that can be an adjunct to in-person teaching or an e-medium facilitating distance in HE [37]. While e-learning is also defined as both procedural and as a learning construct [38], alternatively, it is defined as learning through the use of remote resources, at a distance, using electronic processes [67]. The literature examining massive open online courses (MOOCs) defines e-learning in terms of the scale and global reach that HE institutions can command within the e-learning field [39,40]. More succinctly, e-learning is also defined as formal learning conducted via the internet or intranet [39], thus paving the way for a vast range of resources, devices, and teaching approaches that rely on internet/intranet access to facilitate formal e-learning. It is this latter definition that speaks to the myriad of resources, approaches, and technologies that this review highlights within the contemporary e-learning field.

4.1.2. Technology: Access, Equity, Space, Quality Assurance, and Economic/Socio-Demographics

As Ref. [42] illustrates, contemporary HE students have an immediate expectation when arriving on campus that their devices will pair seamlessly with their university's online systems—an expectation not always borne out of reality. But it does raise the issue of the demands being placed upon e-learning providers by their users. Ref. [43] refers to some employers' expectations that employees will bring their own devices to work to engage with e-learning resources. This reflects the overarching theme emerging in the literature about the complexity of e-learning technology. For example, this includes requiring academics/students to navigate multiple platforms and logins with a mix of managed and personal devices, akin to moving around an in-person campus trying to

find different physical classrooms without maps or room numbers. As such, the work of [2] is considered to be particularly relevant given its emphasis on place and place settings within e-learning platforms. The interdisciplinary nature of this work sees art and design [2,25] being applied to e-learning environments where both students and academics can contribute ideas in shaping the e-learning “space” to meet the learning needs and expectations of all stakeholders. This does not need to be a combative debate between in-person learning and e-learning (ibid), and it is not a Robin Hood approach that the author in Ref. [2] is advocating for, whereby the more dominant populist design of in-person learning space shapes the digital e-learning space. Rather, consideration is given to a symbiotic approach to the e-learning space, which draws on the physical tertiary learning space in a supportive way and vice versa [2,40]. Thus, users are encouraged to allow the subject matter content to dictate the best “e-mode” or “e-space” to use for the specific discipline being taught (ibid).

4.1.3. Artificial Intelligence

It is in the area of Artificial Intelligence (AI) and augmented reality research that the extant e-learning literature appears ready to burgeon. With AI providing the opportunity to support personalised student learning and the downsizing of staff numbers [68], it is also considered to be simultaneously “thrilling and terrifying” [44], given that AI advances in recent months include mastering human language hitherto only the domain of humans. While the chatbot ChatGPT appears to have prompted the most reaction from HE communities [44–46], the pace of change within the law and HE policy development has not matched the pace of accelerated AI development and the resulting ramifications for the HE e-learning sector. As such evidence suggests, much work remains to be completed regarding student confidentiality; ethics; AI teaching proficiency; and related AI product procurement to support e-learning—including algorithm accountability when AI influences student learning [68].

In the area of augmented reality, the literature highlights the range of opportunities that has availed using e-learning for discipline-specific HE, including within dentistry to support students’ understanding of complex dental anatomy [47] and within science/engineering HE education [48], which enabled students to experience sensations beyond what would be possible within physical lab work. But, simply looking at the potential within e-learning platform facilities such as Blackboard, the literature points to HRHE having facilitated applied assessment designs to simulate panel interviews and learning environments to accelerate university students’ applied learning, whilst fast-tracking students’ careers after graduation [49].

4.1.4. E-Learning Space and Presence

From Open-University-style platforms to early MOOCs [38], which have existed in tertiary education for decades, there is evidence of what is possible both in scale and distance—beyond physical in-person teaching, which should root our understanding of remote e-learning proficiency. The rapidity of emergency remote learning in the wake of COVID-19 also demonstrates that when a system is too large to fail, immediate transition to new forms of tertiary learning is possible, albeit they are fraught with difficulties for many. For example, the early stages of the 2020/21 academic cycle saw evidence of “practice mirroring” [2,40,50], where e-learning provision is driven by the familiar aspects of in-person teaching, e.g., contact hours, assessments, and timetables, substituting classrooms for e-learning platforms such as Zoom, Skype, and MS Teams. But the literature challenges us to think instead of ‘presence’ (ibid) within e-learning, which can draw upon both digital and physical space resources, both synchronous/a-synchronous, including everything from digital materials (video and audio) to efficient email responses and support materials [40]. Ref. [2] further offers a challenge in this question—“is our eagerness to return to physical tertiary classrooms fuelled by culture/tradition rather than by relevance of what is being taught?” As such, he asks us to consider instead a ‘desituated’ learning space in which

presence and synchronous live teaching are designed into e-learning spaces rather than the other way around, thus “re-imagining” not “replicating” our institutions online [2,52]. Here, the authors challenge the reader and education providers to invest the same amount of time and effort to the architecture of e-learning spaces as they would to physical in-person learning spaces.

While e-learning may appear to offer ease of access within HE, it does not always equate to “participation” [52] as it is embodied with a range of assumptions that all students/staff have access to a working personal device, robust Wi-Fi, and have home lives free of interruptions and stress. Instead, the literature reminds us that remote HE learning plans must also consider the harsh realities of studying/working from home, e.g., economic factors such as poverty; the need for multiple users to share one device; impact of domestic violence, poor/no Wi-Fi; and lack of confidentiality/support at home (ibid).

Continuing with the equity and fairness theme, there is limited research within the extant e-learning literature focusing upon the inter-generational satisfaction. The research that is evident paints an extremely interesting picture. For example, [61] noted different satisfaction levels between Gen X, Y, and Z students when examining students’ satisfaction with online learning across a range of components from course content, design, delivery, and environment. Ref. [53] echoes this message in seeking to prepare the sector for its future direction, calling for a move away from curriculum design with a uni-generational perspective only, towards curriculum design that appeals across generations. Thus, the literature gap points to the need for HEIs to tailor e-learning provision more specifically to inter-generational expectations.

The authors in Ref. [54] take a longitudinal perspective of e-learning, noting that there is still much for HEIs to do to improve equity and fairness within the field, including improving content, staff readiness, and quality. The authors in Ref. [55] point to the widening, not closing, of the digital divide, arguing that many more affluent private citizens are still unaware of the extent of the barriers that remain in many households trying to access online resources. Evidence suggests this gap cannot be addressed through technical fixes alone. Instead, there is a greater societal need to address the more complex off-line issues of housing poverty and social inequalities, if the digital divide is to narrow [55,56].

The literature also points to the international perspective on e-learning access and engagement, which adds to the complex terrain within contemporary societies, globally. For example [57], e-learning in India is seen as a form of eco-system that meets the needs of learners in numerous ways. Indeed, the study found a series of pillars of e-learning including learner competency, external influences, system interactivity, system influence, as well as digital media and tools. The following question of what influences the perception and acceptance that learners have of e-learning approaches is then considered. Here, authors noted such issues of e-learning being an “impersonal” method of learning, that it demands technological expertise, that there was an inability to “skip” e-learning sessions as might be the case in face-to-face learning sessions, and lastly, pressure from senior family members against e-learning routes, whereas among South Korean learners in Ref. [69], a range of quality assurance factors were highlighted as being important from the learners’ perspectives including QA mechanisms of the institution, institutional credibility, learning tasks, interaction, staff support, learner support, information, and publicity. As such, it was considered that it is important to define e-learning from multiple stakeholder perspectives, not just that of the provider, to ensure the learners’ needs are addressed.

Ref. [58] draws attention to how access and equity issues can arise within e-learning through the images used within teaching materials when there is a lack of attention paid by academics to diversity and inclusion within those images. While there is a strong body of literature pertaining to quality assurance practices and measures within e-learning, the authors in Ref. [59] emphasise how there is still much work to be done to reduce the level of complexity across the QA e-learning narrative given the plethora of factors identified within e-learning QA models, e.g., factors including teaching proficiency, content, assessment,

engagement, and institutional e-learning approaches at the programme and international levels [60,70,71].

4.1.5. Institutional E-Learning Responsibilities

With the rise in people working from home in recent years, the literature [72] suggests this is also the time for HE employers to consider the contractual matters associated with staff undertaking e-learning working from home. Issues to be considered and that will aid wellbeing [72] include more specificity within contracts regarding, how the place of work is defined, hours of work, breaks, pay/expenses, and confidentiality (particularly important when considering how robust personal broadband security maybe and how readily others in the same home as employees might be able to access company information held on business devices in a private setting). Also, contractual clarity is needed regarding the rights of a HE employer to enter an employee's home (virtually or physically) to support an employee for healthy and safety issues, to install/recover equipment, etc. Conversely, other legal/professional bodies [73] have modified general advice in the wake of the COVID-19 outbreak—adding more empathetic tones to formal guidance on home working, including the need for a more caring employer attitude and alternative ways of completing tasks and fulfilling roles. Further still, these calls include additional challenges for employers, such as guarding against an assumptive attitude that certain tasks cannot be undertaken at home. Consideration also needs to be given to any assumption that staff can and should use their own device/equipment at home to undertake business duties [72].

In addition, e-learning staff/students' wellbeing can be impacted through each individual's interpretation of how an e-learning working day should be constructed. As such, safeguarding against "isolation" presents issues that have existed long before "self-isolation" became part of our daily lexicon—but which can be exacerbated by it. Therefore, e-learning research needs to provide consideration of work/life balance matters that can arise in a formal on-site HE environment and that can be replicated in an e-learning distance work setting [74]. Indeed, some charities specialising in mental health matters advocate a range of practices to aid employees and employers alike including the need to talk about challenges, having resources in place to support all staff—not just employees, and the need to keep in touch with one another [74]. Refs. [44,51] found the issue of mental health within distance learning at the Open University Business and Law Faculty to be so vital that they developed a wellbeing toolkit for users to support their programme content. As such, this paper proposes that well-established practices for online learning and working from home can aid employees within HE, but this area requires further research.

Irrespective of whether learning is core to the business (as in higher education) or a development need of employee(s) to aid organisational performance and learning, convenience and adaptability are core to the learning experience. When considering the reliance on internet, Wi-Fi and broadband technologies, the reliability of each is central in how e-learning is delivered and supported and how it enhances online learning [63]. Drawing upon the principles of massive open online courses (MOOCs), knowledge, expertise, support, and leadership are central to the successful transition to this new approach to work and learning [39], all requiring more work to aid quality provision—not less work [8]. Indeed, this move to large-scale online learning and the related instructional rigour—expected and demanded in face-to-face education provision—was often absent in early MOOC provision [63]. Drawing upon the Community of Inquiry (COI) framework in education [64], there is a need for learners to have opportunity to engage in the social, cognitive, and teaching elements of e-learning, irrespective of the medium used to deliver such learning. According to research among participants of MOOCs [42], the technological infrastructure is crucial in online learning to support a COI approach. Even when the technological infrastructure is inadequate, participants indicate that such technology is beneficial, given that it enables interaction, flexibility, and collaboration. In contrast [64], studies also point to the need for ongoing empirical research into the efficacy of COI within online learning. Of particular relevance to the contemporary global shift to home working

and education provision, the literature also considers the possibility that new frameworks are needed to replace and/or extend existing knowledge of COI within e-learning provision in order to meet the escalating global demand [64,65].

In anticipation of the future generational demands, which HEIs should consider, UNICEF's report on children's use of technology in a "connected world" [75] is poignant, albeit a report that veers away from the HE sectors (it is deemed necessary within this future direction aspect of the paper). UNICEF's [75] indicates that while a small group of children will inevitably encounter adverse experiences when they use digital technology, this is not directly related to the time they spend online. Rather, when considering such experiences, more attention should be paid to what children do online, their environmental supports, networks, and the content they are exposed to. Having a balanced approach to screen access time (neither too little nor too much) should be considered. This is a concept seemingly endorsed in an earlier study [76], albeit involving adults, which argues that procrastinating learners perform better when they engage with discussion boards during online learning—that is—that they engage with content through support mechanisms made available through the e-learning process. A finding that is considered vitally important in the conclusions and future direction sections of this paper can be found below.

4.2. Scoping Review—Discussion

The preliminary search results and analysis were then used to inform a more detailed search for SLRs aligned to the research question and objectives. Following coding, data extraction, and analysis, the following addition to the discussion is provided, which highlights both endorsement of the preliminary themes as well as additional themes.

An SLR examining the Portuguese perspective of the sustainable development of education through e-learning in HE is provided in Ref. [20]. Interestingly, not only does the study consider e-learning from an undergraduate, postgraduate, and Ph.D. perspective but also students who are studying while in full-time employment. The study also puts forward the need to consider student motivation, satisfaction, and competencies within an e-learning HE context. Encouragingly, the study found that e-learning can be an effective alternative to in-person study at university for those studying part-time and working full-time. In addition, the article points to the importance of HEI's responsibility for creating a conducive education environment that endorses the theme of institutional responsibility from the preliminary review undertaken earlier in this paper. The dimensions against which students' responses were measured also reflected some of the categories from the preliminary search, namely learning quality, structure and organization of materials, and interdisciplinarity. In addition, results indicated students were highly satisfied with the sustainable e-learning aspect of their studies but also contributed to a higher likelihood that respondents would return to the same university for a repeat study. This was important given the three-cycle design at the university that formed the focus of the case-study, e.g., bachelor's degree, master's degree, and Ph.D. research. In summary, the authors of Ref. [20] found that the key contributors to students' satisfaction in the sustainable e-learning aspect of their degrees included communication tools, teachers' expertise and motivating skills, learning e-activities, as well as the societal impact. The study does not advocate that e-learning is a substitute for in-person study but rather it supports the case for e-learning as an alternative to physical in-person teaching, provided it is based upon sound and valid pedagogical practice. But as this is a HEI-focused article, the study focused upon science-based subjects, not business/HR provision.

The role of gamification was presented in Ref. [66], and it is considered that this added a new dimension to the e-learning category from the preliminary search undertaken earlier in this paper. As a growing area of third-level pedagogy that speaks to the changing demands of current and future cohorts who have been raised with gaming and e-devices, this study makes a particularly nuanced contribution to sustainable e-learning provision in HEIs aligning with the inter-generational identified [66] in the preliminary search. The SLR in Ref. [66] examined 90 papers and considered important issues such as design elements,

which increased the likelihood of student engagement with their studies including rewards, badges, scoreboard points, and avatars. This SLR in Ref. [66] also found design principles linked to student motivation, thus adding to the published works considered in this scoping report, which examines how to increase student motivation through e-learning, Ref. [20]. Importantly, Ref. [66] also points out that gamification, when incorporated well into e-learning within HE, is more effective as an e-learning tool when users/students can personalise it to their needs. Conversely, the study Ref. [66] emphasises the reverse is true, i.e., pointing to e-learning gamification attempts within HE provisions that are failing because it lacks design principles that allow for personalisation by users. Albeit the study in Ref. [66] points to the need for more research in the content of gamification with HE and its learning systems while recognising this area of e-learning HE is still growing within research—or as the authors describe it—the area is still “immature”. It is encouraging though to note that this article also emphasises the important of institutional responsibility in developing the e-learning environment, necessary to support HE pedagogy infused with gamification.

In the SLR undertaken in Ref. [25], emphasis is once again placed on the importance of the pedagogical design of e-learning, what the authors Ref. [25] refer to as a “delicate balancing act” between educator and learner that calls upon learning theory. The authors of Ref. [25] determined that a range of dimensions was important, including content and process scaffolding (i.e., the pedagogical building blocks of embedding e-learning approached in provision, plus peer-to-peer learning, and formative strategies). Of note is the emphasis placed upon the need for students to develop their own learning process within e-learning as this helps learners adapt more easily to changes within the learning environment.

This scoping review also considered Ref. [26], where the importance of principle-based teaching and learning was emphasised and where principles espoused the values needed to make sustainable e-learning effective. All within the context of Web 3.0. Ref. [26] considered 25 peer-reviewed publications when examining the effects of e-learning technologies on librarians within a university context. The SLR Ref. [26] reflected many of the themes identified in the preliminary search as well as in this scoping review, e.g., the role of gamification to improve students’ motivation to learn augmented and virtual reality but also examines the role of block-chain technology within the online professional development of librarians, the benefits of which include “security, transparency, and trust of this technology” and with the parameters of quality e-learning being identified as “accessibility, reliability, usability, interactivity, content quality, communication and support, assessment and feedback, security and privacy, and technical support”. While the challenges being faced by librarians amid sustainable e-learning practices were identified [26] as being a shortage of skilled manpower, the unavailability of adequate IT infrastructure, lack of technical support, copyright issues, poor planning, and ineffective library leadership are major challenges in implementing emerging technologies in e-learning.

The authors of a further SLR, Ref. [28], also acknowledged the many benefits that sustainable e-learning makes to educational settings (akin to the benefits pointed out by many of the authors in this paper). But in addition, the authors in Ref. [28] highlight that assessment quality remains an important issue that needs further attention within the sustainable e-learning educational field. Of note, in the findings from this SLR (which also included primary research), the study points to a lack of attention being paid to the quality and effectiveness of software needed to support sustainable e-learning.

Further study [29] considered 170 published works in another SLR. The richness of the findings indicates the need for a much more “explicit” approach to e-learning content and related learning experiences, where choice of appropriate platforms can make this content task easier. But the study also points to the importance of feedback and the need for stronger professional communication between instructors and students particularly in relation to assessment design within e-learning, particularly as cheating and plagiarism can increase, given that it is difficult to invigilate e-assessments in the same way as an

in-person examination. The author in Ref. [29], while emphasising the importance of communication in the educator/learner relationship, also points to the risks involving feelings of “isolation and intimidation” for users due to problems they encounter with some learning platforms. But for all the challenges that can be associated with sustainable e-learning practices, Ref. [29] also points to the many benefits for users including career opportunities and reduction or elimination of commuting/driving.

A study examining trends in the affective use of computing in a range of e-learning environments—including education [30] that was based upon a corpus of 27 papers. The study defines e-learning as “...an evolution of distance learning but with the use and exploitation of telecommunication technologies”, this SLR considers published research into the role of computers in interpreting the emotional state of users within e-learning. The approach is referred to as “affective computing”. The SLR found that the most common e-learning environments that have affective computing built into them include “intelligent multi-agent system, affective tutoring system, teachable agent, social robot and intelligent tutoring system”. The authors in Ref. [30] found these environments were the most popular because they relied upon conversational language where emotion can occur and therefore can be detected with affective computing systems. Though this SLR also found that affective computing was not exploited as much as it could have been within the research that was analysed. The most frequently analysed emotions that were found to link to learning and achievement included learner-centred emotions, i.e., joy, enthusiasm, hope, relief, pride, gratitude, admiration, sadness, anger, anxiety, hopelessness, shame, and guilt, whereas the most dominant emotions within the e-learning experience, more generally, were found to be confusion, flow, boredom, frustration, and delight. Conversely, surprise was not found to be as frequent an emotion, while anxiety was found to be mostly present during assessment tests. In addition, the study also concluded there was no consensus within the published research regarding a definitive list of e-learning emotions. Software that recognised facial expressions was found to be most common due, in part, to being more economically viable. While the research found some of the published work focused upon psychological emotions, they require specialist equipment. While voice was measured least frequently of all, possibly due to the difficulties encountered with the range of cultural voices of users [30]. The behaviour of users was also found to have been studied across the published works [30], through the users’ interaction with log-in files. Interestingly, the SLR Ref. [30] also found that the emotions data were collected for a range of purposes including 70% of published works, examined in the SLR was for the purpose of designing or building affective systems and methods. The remainder gathered emotional data for examining regulation strategies and others for emotional measurement methods.

A more unique perspective on sustainable e-learning is offered in [31]. In this study the authors considered, a framework for quality assurance for archives and records management education in an open distance e-learning environment in the higher education sector in Eswatini. The results of the SLR indicate that providing a quality assured archive and management records programme is more cost-effective if delivered via a distance e-learning format. The benefit being that it enables students to work full-time and study at the same time, no matter how geographically spread they are from the university campus. The SLR also highlighted that the published works that had been examined indicated that distance e-learning provision should be coordinated and managed by experts not involved with in-person provision to ensure the distance e-learning programmes receive the necessary support and focus. The published works in this SLR [31] also indicate the need for a set of agreed quality assurance criteria for e-learning archives and record management programmes, which encompass all AMP provision as opposed to a quality assurance focus—one programme at a time. The criteria for the quality assurance framework are offered to aid flexibility within the HEI e-learning provision, draw upon national quality assurance frameworks, establish a minimum competence e-learning standard for archive and record management provision, and should have authority and oversight by the quality control council, which may sit outside the HEI sector. As such, the quality assurance

framework recommended from this SLR [31] comprises institutional policy and mission; programme design and development; learning infrastructure and resources; student assessment and evaluation; examination/assessment security; and student support and progression.

The SLR undertaken in [32] considered research trends in measurement and intervention tools in e-learning environments—where students self-direct their own learning. The SLR emphasised that the published works that were examined tended to use data collection methods that rely upon qualitative questionnaires and learner analytics as well as some self-reporting tools. The review also indicated that many of the published works studied in this SLR had identified the growing popularity of a range of AI software. Interestingly, this SLR [32] also identified no uniform framework in the published works studied about how self-directed e-learning takes place. It also identified a series of challenges faced when supporting self-directed e-learning. These include different constructs being measured, which in turn have their origins in a range of different aspects of education theory. Yet there were no clear guidelines on how to guide learners' levels of self-directed learning nor about the extent of scaffolding.

A range of other SLR reviews, considered as part of this scoping report, has also emphasised a range of issues within the research examining sustainable e-learning. These include Ref. [33], which emphasises that online communication tools such as google forms and MOOCs can aid students' satisfaction with e-learning assessment as they offer a helpful means of feeding back to the students. The SLR also highlighted the important role of senior faculty members within HEIs in managing quality assured assessment and feedback practices. While the SLR undertaken by the authors in Ref. [35] emphasised the need to use e-learning tools more within assessment of preservice teachers studying at university by both using e-learning tools more frequently when administering assessment but also adopting the e-learning tool within the assessment design. Whereas the SLR undertaken by the authors in Ref. [4] highlights that the most common theories across the 248 published works on sustainable e-learning research were community of inquiry and the technological acceptance model. Finally, the SLR undertaken by the authors in Ref. [20] suggests that e-learning can be effective for those students working and studying at the same time, thus creating a viable alternative to classroom/in-person teaching. But importantly, this SLR also points to the effective role that e-learning has to play in life-long learning provision.

4.3. Summary of Evidence: Challenges and Benefits and Addressing the Research Question

The research question outlined at the outset of this paper asked, "What is known about sustainable e-learning HRHE provision, within the literature in terms of themes, benefits, challenges and future directions?" As such, this summary of evidence seeks to address the response.

A total of 61 publications were screened as part of this scoping review to identify the themes arising from the interdisciplinary extant literature published between 2005 and 2023. The findings indicate a range of challenges, benefits, as well as future directions, which, it is suggested, could be helpful for researchers in the HRHE discipline who may be interested in expanding their research or need to inform it further. In particular, the study indicates limited publications and equally limited quality research being undertaken in the field of sustainable HRHE provision. As such, the findings have been taken from the interdisciplinary extant literature within sustainable e-learning and tertiary education for those over 18 years of age. From there an examination of the challenges, benefits, and future directions for the field have been put forward.

This paper found the main challenges to be the lack of consistent input from senior faculty members with responsibility for sustainable e-learning strategy across HEIs. There was also a consistent theme within the review of a lack of long-term investment in sustainable e-learning software, which could support innovative capability in how e-learning is measured within HEIs. However, the problem with the latter is that findings indicate such innovation is vital given the link between user satisfaction and e-learning in HEIs. The

findings also suggest there is a lack of thorough and appropriate support for the training and development of e-learning academics and educators. The range of terminology in use across published works is also a considerable challenge as it acts as a further barrier to researchers seeking to examine consistent practice within the field. The lack of robust quality assurance practices aligned to institutional and national quality e-learning frameworks was also identified as being problematic. There is then the ethical challenges emerging in the burgeoning area of AI and virtual/augmented reality across the university e-learning field. The findings indicate much work needs to be done in being transparent with all users of e-learning across HE provisions to make them fully aware of the emotional and personal information that can be gleaned from e-learning education processes without the users/students being informed. This becomes even more problematic when it is considered that the software and platforms at the heart of this ethical debate also contribute to higher user satisfaction levels within HEI, when they appear to aid the self-directed study aspect of e-learning.

The findings also indicate a number of benefits arising from sustainable e-learning HE provisions. These include the flexibility offered by individually tailored learning experiences, which is particularly attractive across inter-generational cohorts. The findings also show that e-learning approaches are particularly beneficial to those studying at university while working full-time. The innovative and creative opportunities that e-learning HE practices offer were noted across a number of studies that formed part of this review, such as gamification and the use of block-chain technology. The flexibility that e-assessment design offers HE students is also noted. The latter though is dependent upon the need for e-learning users and academics to be well versed in the uses of e-learning approaches and sound pedagogical design principles. The benefits discussed within the literature that formed part of this review also point to the considerable opportunities which are available to HEIs through sustainable e-learning practices including the opportunity to think creatively about desituated space design, that is, teaching and learning spaces that are relocated to an online equivalent space. Further, there is benefit in HEIs giving a similar level of attention and planning to this desituated e-learning space as would be afforded to the design and architecture of physical in-person teaching space in HEIs.

5. Limitations

It is acknowledged there are some limitations of this scoping review, which should be considered for anyone wishing to replicate or expand this study. These include the following:

- When using a protocol, it is recommended that thought is given to registering it with co-authors/fellow researchers in order to seek feedback from them regarding the overall appropriateness of the protocol;
- While this scoping review was undertaken by a single author. There is merit in collaborating with other reviewers, to aid objectivity, should a systematic literature review be undertaken in the future;
- This scoping review was aimed at providing an initial contribution to the literature gap identified at the outset of this paper. The suggestion is made that consideration could also be given to undertaking a more extensive systematic literature review and meta-analysis of sustainable e-learning HRHE provision, in order to further aid this research field;
- It is also noted that the use of the most recent version of NVivo/equivalent software would help aid efficiency of coding and minimise the time required to manually code each publication;
- Having more than one reviewer involved with a scoping review would also enable more reviewers to be involved in checking and approving the list of publications considered within the review;
- It is also noted this scoping review focused upon identifying the challenges, benefits, and future directions of sustainable e-learning in HRHE provision. In any future

expansion of this paper, it is suggested that methodological design comparisons between publications could also be included in the review.

Please note: in relation to the PRISMA-SCR framework and the section referred to as “selection of sources of evidence”, as this paper is a single-authored paper, no one else has been involved with deciding the list of selected publications in the review.

6. Conclusions

The following conclusions are drawn from the review of the interdisciplinary e-learning literature—both the preliminary literature review and from the scoping review. The section seeks to highlight the key points that should benefit current and future academics and stakeholders interested in shaping future HR e-learning pedagogy and methodologies with a view to sustaining tertiary e-learning praxis. It should also aid those interested in progressing ongoing academic debate on the sustainability of e-learning within HRHE provision. Importantly, it is noted that given the significant gap in HRHE-focused e-learning research, much has to be drawn from allied publications in the sustainable e-learning tertiary field. As such, the following conclusions are put forward to aid HRHE researchers:

- a. The terminology and lexicon of terms across the field is diverse and multi layered. While at one level this speaks to the complexities within the field, it is also suggested it raises the potential for an increase in confusion across a range of contextual debates within the e-learning field and may hamper international and inter-institutional collaborative research which is needed to sustain the profession;
- b. Technology: Equitable Access and Quality Assurance—the related issues are as numerous as there are e-learning stakeholders. As such, more research is required to investigate the multi-level factors impacting the related models, in particular consideration of the international dimensions and inter-generational nuances;
- c. Space and Presence: There is a cultural tradition to design e-learning processes based upon what has been conducted in the past for in-person campus-based provision. This is problematic given that e-learning engagement and satisfaction levels differ across both provision types—indicating that different e-learning design principles are necessary. The risk is that in the absence of specific e-learning architecture, HEIs end up with a series of disconnected platforms—all requiring separate logins and virtual locations. This in turn can add to the frustrations of learners and instructors not to mention the related inefficiencies;
- d. HEI Responsibilities: These range from contractual/HR responsibilities through to teaching and learning, staff/student wellbeing, and working contexts. This particular conclusion veers most into interdisciplinary field of research as it highlights the importance of the tertiary context in which e-learning is set—not solely academically based;
- e. Bring Your Own Devices (BYOD): There is growing pressure on HEIs to ensure contractual arrangements are in place to protect employees and employers from data protection issues arising from staff being expected to BYOD their own devices when working on e-learning processes as part of any e-learning initiative within the HE. This issue also highlights the need for an examination of the safeguarding practices surrounding students’ use of their own devices as part of their e-learning studies;
- f. AI and Augmented Reality: The pace at which HEIs are leading and supporting e-learning processes and contexts is not matching the rapid pace of AI/augmented-relative advances. The impact on staffing levels, student safeguarding, liability, and quality assurance issues is potentially severe. Having considered the conclusions arising from the preliminary literature review within this paper, consideration will now be given to the additional conclusions arising from the scoping review, including the following;
- g. Pedagogy: The need for sustainable e-learning to be underpinned by clear pedagogical principles came through strongly within the scoping review, particularly in relation to tertiary education. Encouragingly, the review also highlighted the need for a greater focus upon the structure of e-learning content;

h. Gamification: this is a contemporary development within the review both within an intergenerational context and the changing needs of current and future university cohorts, but it is also seen as a motivator within student learning to aid sustainable e-learning;

i. Teaching Values: Of note, within the review, is the emphasis placed upon instructors' and lecturers' approaches to tertiary education. In particular, the need for value-led and principle-based approaches to e-learning;

j. Expanded technology: The scoping review also adds to the earlier technology theme highlighted within the preliminary review. Namely, the need for greater investment in and training on more advanced technology to support sustainable e-learning. This includes consideration of block-chain technology. Adding to this, the scoping review also emphasised that the choice of platform used within e-learning provision is important and has an impact upon sustainability, in terms of the appropriateness of the platform, whether adequate training and support is given to users (staff and students) and whether there is appropriate investment. It is also concluded that there is a strong ethical issue growing across the technology and software used within e-learning, particularly in relation to affective computing, i.e., that which enables the emotions of users (non-verbal and verbal) to be read. As such, how organisations embrace such technology and how they do so ethically while being open and transparent to users is emerging in the literature as being of paramount importance in sustainable e-learning practices;

k. Assessment: throughout the scoping review, it is noted that not just quality assurance practices were called for within e-learning assessment but also the need for quality software to appropriately support e-learning assessments;

l. Quality Control: While quality assurance has been addressed within the context of e-assessment, the scoping review also indicated that much of the examined published work also focused upon the need for wider quality assurance practices across the e-learning within HEIs. But in addition, the research that was examined as part of this paper also indicated the related need for such quality assurance practices to have set criteria and to be governed using institutional and nation quality assurance frameworks affecting tertiary education. Within that, there is an important role for senior faculty members in overseeing such quality assurance matters;

m. Self-directed e-learning: there is also a clear indication that given the preponderance for self-directed learning within e-learning environments, this review also highlighted the need for further research into the measurements and intervention tools to support self-directed learning more fully;

n. Flexibility: the scoping review has also indicated that sustainable e-learning is particularly beneficial for those tertiary students who are working while studying at the university level, at the same time.

o. User Satisfaction Levels: The extent to which users of e-learning processes are satisfied with their experiences can be impacted by a wide range of drivers, including the type of platform used and the level of proficiency exhibited by the instructor/lecturer when adopting e-learning practices. As such it is concluded that e-learning has an important role in the long-term development of adult learners.

7. Future Directions

To meet the overall purpose of this paper, the future direction of the field also needs to be contemplated. Together with the conclusions stated above, there are a number of factors that are crucial to the future direction and sustainability of the e-learning field. These include the following:

1. Firstly, uni-generational versus inter-generational design influences: the traditional influence shaping e-learning contexts from processes, setting, content through to academic staff proficiency, and student satisfaction levels is shaped by a focus upon one generation at a time—the generation forming the student body in any given provision cycle. However, as this paper has highlighted, inter-generational satisfaction levels with e-learning processes differ from generation to generation, inferring more

complex reasons for such differences. As such there is a need for more academic attention to be paid to investigating the drivers and impacts of those differences upon HEI e-learning provision, long-term, if e-learning is to be sustained ethically and with relevance for future cohorts, staff groups and society at large;

2. Secondly, the AI dimension that is emerging through chatbots such as ChatGPT is the single most pressing matter, which the e-learning academic community and sector appear to be facing. The urgency is coming not just from the speed with which the software is developing—at a pace quicker than HEIs can strategise about e-learning practices and frameworks— but also coming from the imminent threat to human involvement within the e-learning process, which is causing one of the greatest ethical and interdisciplinary concerns within the HE sector, globally. Quite literally the question about whether or not there is a need for the human factor in the future to enable e-learning to be sustained is beginning to be articulated. A question that, this paper contends, now demands immediate and robust investment and academic attention across both scholarly and research activity;
3. Thirdly, it is suggested that much research remains to be done on the complex infrastructure needed if e-learning within tertiary education is to be sustainable, including innovative technology such as block-chain, as well as addressing the structure and ethical issues arising from sustainable e-learning practices and institutional responsibilities, long-term. This should consider the pedagogical roots of e-learning and the ongoing development of academic staff and students in e-learning practices but with the appropriate level of attention given to ethical parameters. Amid the rising societal popularity of sustainable e-learning matters—where researchers are encouraged to avoid being swept along in populist narratives—appropriate methodological candour is needed. This will help to ensure learners and HE institutional needs given due attention;
4. HRHE provision: There is also scope for HR researchers and HR educationalists to consider greater scrutiny of sustainable e-learning practices as they apply to HRHE provision directly. This will enable the specialist field of HRHE provision to be better supported with niche research and scholarly work and will minimise the need for reliance on interdisciplinary sustainable e-learning research to determine the quality of research as it pertains specifically to HRHE provision;
5. A future SLR: Finally, it is suggested this review has provided a case for a full systematic review of literature to be undertaken in the future to further aid researchers in the field of HRHE provision who are interested in studying sustainable e-learning further. It is also suggested that this will provide an added baseline and reference point for academics in the field. It is also suggested that it will help contribute to the existing gap in the literature in relation to sustainable e-learning within the HRHE provision.

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