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Review Article

A systematic review of changing conceptual to practice in learning experience design: Text mining and bibliometric analysis

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ABSTRACT

Learning experience design (LXD) is a new wave in educational technology and learning design. This study was conducted to clarify conceptual change to practice by applying a systematic literature review to a combination text mining and bibliometric analysis technique to visualization network. Based on the study selection articles from SCOPUS. Our research questions focused on the changing concept, the elements of dimensionality, and the process or practice of LXD. The findings showed that 152 articles were finally selected to be analyzed. Conceptualizing LXD is currently underway in design thinking and user research methods with emphasis on the empathize process. Moreover, three dimensions to consider including (1) design dimension focus on user experience design in a technology context, (2) learning dimension focus on instructional design and learning theory, and (3) standard dimension focus on assessment and evaluation in learning goal and project management. In addition, five steps cycle for practice follows: research learners as users and learning goals, design with ideate, develop prototyping, validity testing, and launch and follow-up. These factors enhance learning engagement and aesthetics for a great learner experience and learning efficacy.

Keywords: conceptual to practice, learning experience design, systematic review, text data, bibliometric analysis

INTRODUCTION

Academics and experts have been discussing the science of Instructional Design in terms of integrating modern technology to improve, develop, and increase learning efficiency. The process emphasizes creating a systematic approach to achieve better learning outcomes. It is often replaced by digital learning design, as viewed by modern educators, that extends beyond the limits of the educational institutions governed by the systematic curriculum plan. The objective is to manage changes in design for lifelong learning society (Schmidt & Tawfik, 2022). Such a process results in a social structure that transforms into an Internet network. The creation of a digital society, where everything happens and how it interacts is limited. Users become producers, create, and can interact with information networks, individuals, or groups on an unprecedented level. Moreover, it is one of the critical conditions for changing people's learning behavior that is faster and more equitable. For this reason, behaviors, methods, channels, and places for learning have changed. Therefore, the teaching and learning system's design and management are needed to adapt to the new

ecological structure (Center for Contemporary Social and Cultural Studies, 2019; World Economic Forum, 2021). In addition, a report by World Economic Forum (2022) and a global information technology company like HolonIQ stated that after the outbreak of COVID-19, educational institutions and business organizations related to human resource development started to develop more practical learning platforms and forecasted to grow continuously. Besides, there are more jobs related to designing and developing products that support learning on digital platforms. According to a Seek and LinkedIn report, these jobs have grown 12% over the past five years. More areas of e-learning facilitation and user experience design (UXD) skills were identified (Seek, 2022), consistent with the report of Schmidt and Huang (2021) that discussed the rise of UXD concepts in the context of digital learning until it becomes learning experience design (LXD) and increases exponentially during 2015-2020.

Learning Experience Design Conceptual

LXD was established from the development of the science of instructional design that emphasizes the development of learners to achieve learning objectives. The emphasis is related to how to enhance a positive attitude while creating a good experience with modern technology to match and seamless learners' needs and ensure that learners can receive information at any time by embedding straight into daily life workflows for effective learning outcomes. **Figure 1** shows timeline of instructional design to LXD.

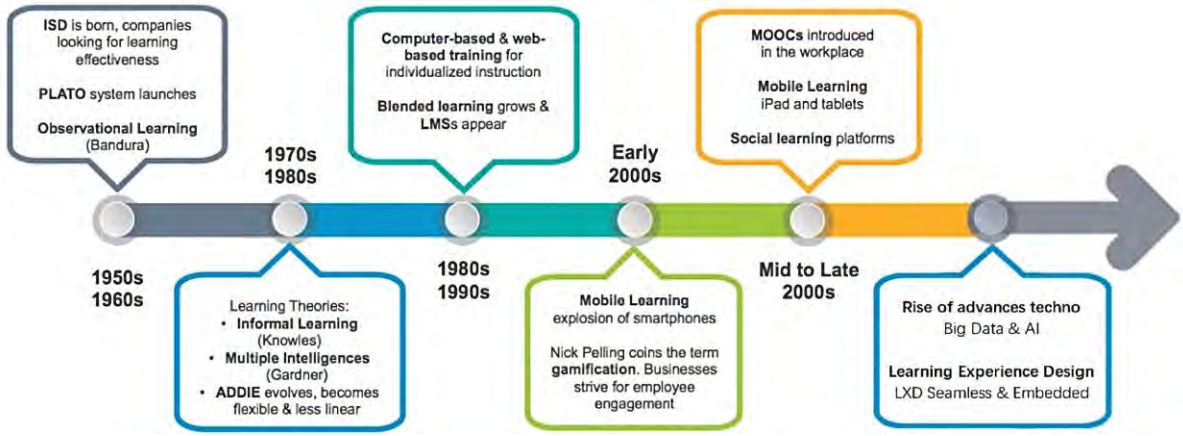

Figure 1. Timeline of instructional design to learning experience design (Source: Authors, based on Reiser & Dempsey, 2018)

LXD represents a new trend of learning design in the digital era that arises from applying interdisciplinary design concepts to develop the learning process for learners. LXD is mainly processed on the internet and relies on digital technology devices. This learning system emphasizes the power of a well-designed user experience, which enhances learning quality (Jahnke et al., 2020; Schmidt & Huang, 2021; Stefaniak et al., 2020). UNESCO (2013) stated that designing or organizing good learning activities is a process of creating experiences for learning in diverse contexts and environments, which can create and change learners' perceptions according to challenging and interesting situations while promoting learners' participation. Besides, LXD is suitable for learners who need facilitation in understanding concepts and nurtures the acquisition of knowledge, skills, and attitudes while considering the emotional qualities of the learners (UNESCO, 2013). In addition, expert scholars mentioned that LXD is a human-centered and goal-oriented design process. LXD combines design theory approach and learning theory approach through instructional design principles that support the design by focusing on the quality of user experience with the concept of "experience", which creates awareness to enhance the good experience of that product or activity. The concept of experience is the user's behavior in every moment continuously in a particular context until it becomes perception, interpretation, and emotion during the interaction. Resulting in the aesthetics of quality learning (Batoufflet, 2019; Chang & Kuwata, 2020; Emmanuel et al., 2021; Floor, 2018; Google, 2022; Gray et al., 2020; Kovatcheva, 2018; Kraus, 2017; Pan et al., 2021; Robinson & Harrison, 2017; Schmidt & Huang, 2021; Thurber, 2021).

Most researchers agreed that LXD emphasizes design science to meet the needs of digital environments (Kovatcheva, 2018; Schmidt & Huang, 2021; Stevens, 2021). UXD methodology emphasizes the Human

Centered Approach in the context of learning development. Based on various factors, including gender, age, race, religion, education, and economic and socio-cultural differences. The official start of UXD was in the 1990s by Don Norman, a cognitive scientist with a team at Apple computer. Stating that it is not just designing a human interface for one use only but covers all aspects of the user experience of systems, such as service design, graphics, and physical interactions (Kovatcheva, 2018; Schmidt & Huang, 2021; Stevens, 2021). **Figure 2** depicts LXD concept.

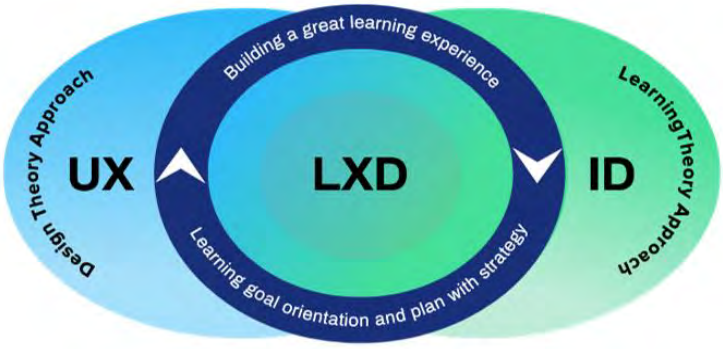

Figure 2. Learning experience design concept (Source: Authors)

Text Mining and Bibliometric Analysis

Text mining and bibliometrics are methods used to extract and organize large volumes of information from publications. In this study, VOSviewer, a freeware developed by University's Center for Science and Technology Studies (CWTS), was used for constructing and visualizing networks. This tool also offers text mining functionality that can be used to construct and visualize co-occurrence networks of important text terms extracted from academic publication databases such as Web of Science, SCOPUS, PubMed, and more. This can assist researchers in summarizing and describing the structure and evolution of scientific data, detecting research fronts, and identifying trends or transitions within a discipline (Leydesdorff & Nerghes, 2017; Van Eck & Waltman, 2022).

However, LXD is still a relatively new concept and does not have a clear design framework. There are also challenges in integrating modern technologies through the digital environment. Therefore, educational technologists must study and synthesize this changing body of knowledge to identify elements, scope, and workflows related to LXD to prepare for the next generation. The research questions are, as follows:

RQ1. What are the concepts changed and trends in LXD?

RQ2. What are the dimensions of studies related to LXD?

RQ3. How does the LXD process work?

METHODOLOGY

Both systematic literature and scoping review were applied in this study (Arksey & O'Malley, 2005; Booth, 2016; Cooper, 1988; Joanna Briggs Institute, 2015; Kraus et al., 2022), using map based on text data and bibliometric analysis method by VOSviewer software (Leydesdorff & Nerghes, 2017; Van Eck & Waltman, 2022). Based on the study selection articles from SCOPUS because focus on social science and educational research publications. Following procedures: problem formulation by goal and scope, define data source and collection, data screening and evaluation, data analysis and interpretation, and reporting, shown in **Figure 3**.

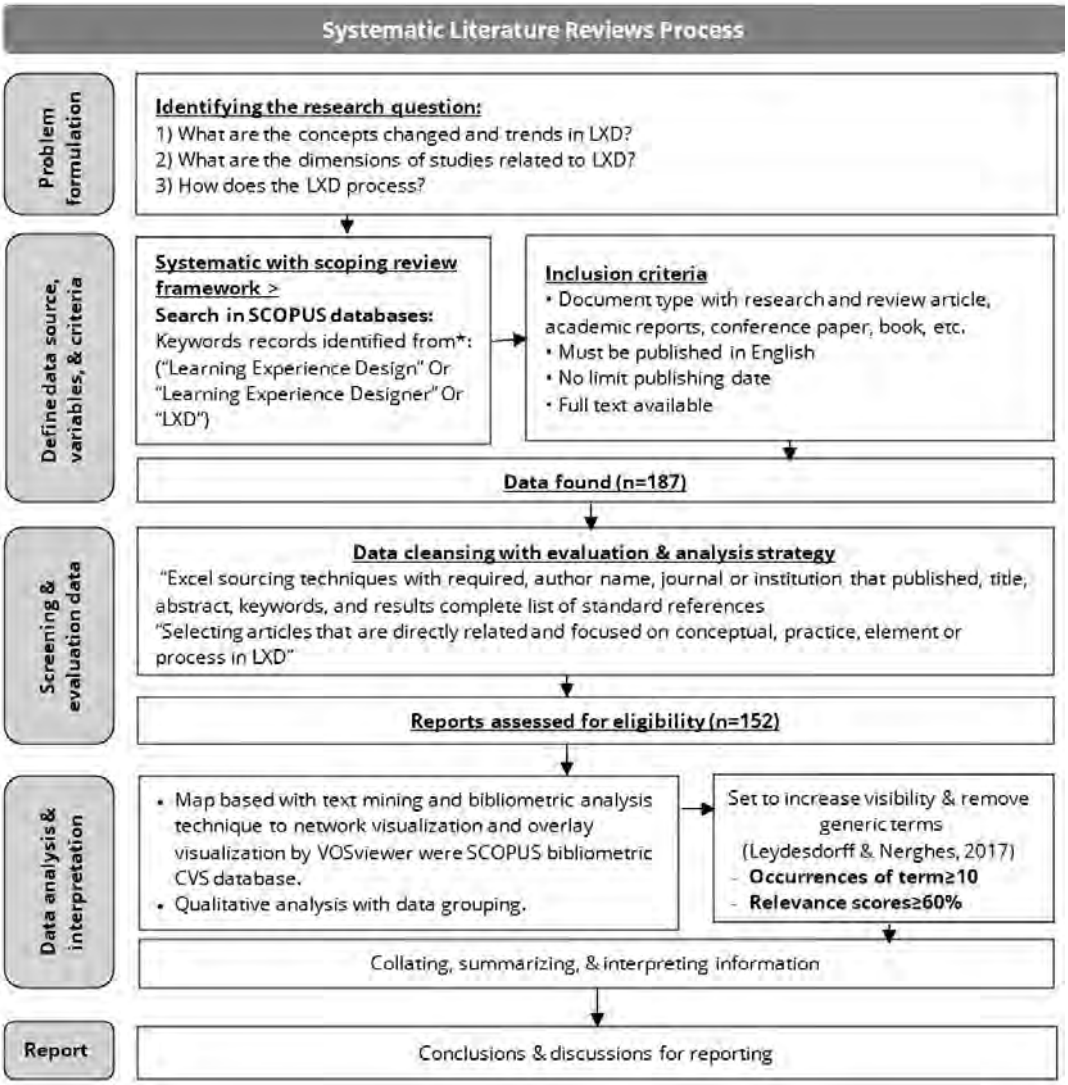

Figure 3. Procedures of the systematic reviews by text mining and bibliometric analysis (Source: Authors)

FINDINGS

RQ1. What Are the Concepts Changed and Trends in LXD?

According to the publication information, academic papers, research papers, and books related to LXD from the database according to the specified conditions, 187 titles passed the quality assessment with complete information of 152 titles. In 2000, there has been a steady increase and leap forward in 2018 – 2022, with the highest publication in 2021 of 34 titles, as shown in **Figure 4**.

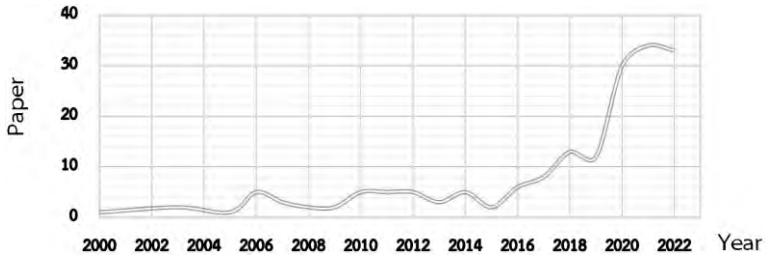

Figure 4. Annual number of articles published in SCOPUS (Source: Authors)

Top-5 cited scholars as authors and co-author on LXD included Ioannou A., with a citation value of 34, and Levett-Jones T., with a citation value of 31 Georgiou. Y. has a citation value of 28, Schmidt M. has a citation value of 21, and Tawfik A. Andrew has a citation value of 19, respectively, as shown in **Figure 5**.

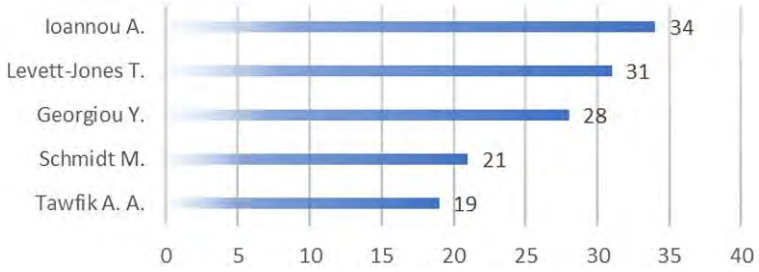

Figure 5. Citation/co-citation authors who published in SCOPUS display by VOSviewer (Source: Authors)

In addition, the results of the concepts changed and trend analysis of the highly cited LXD study issues can be divided according to time into three main groups:

1. The purple group was published before until 2017, mainly focusing on educational issues related to the education and learning system with outstanding words: Learning theory, student, group, and university.
2. Green group: Between 2018 and 2019, is mainly focused on educational issues related to UXD principles with outstanding words such as experience design, user experience, and design principle.
3. The yellow group: Since the year 2020, the focus has been on education issues related to design thinking principles.

Outstanding words are design think, empathize, engagement, researcher, and usability, as shown in **Figure 6**.

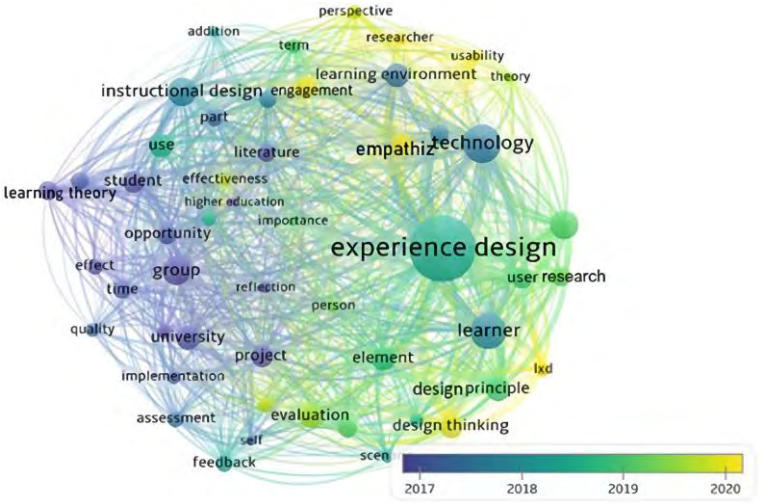

Figure 6. Concept changed & trend in LXD with key term overlay visualization techniques by VOSviewer (Source: Authors)

RQ2. What Are the Dimensions of Studies Related to LXD?

The study and development dimensions of LXD represented by each word appearing on the title, abstract, and keywords from published papers were found to consist of three main dimensions according to color groups:

1. The green cluster, which is related to design technology dimension approach, map based on text data including experience design, technology, learner, user experience, design thinking, design principle, empathize, user research, learning environment, HCI, and usability.
2. The red cluster is related to the learning and education dimension approach, map based on text data including instruction design, learning theory, course, student, group, university, and opportunity.
3. The blue cluster is related to the standard dimension approach, map based on text data including project, evaluation, quality, implementation, scenario, goal, assessment, and feedback, as shown in **Figure 7**.

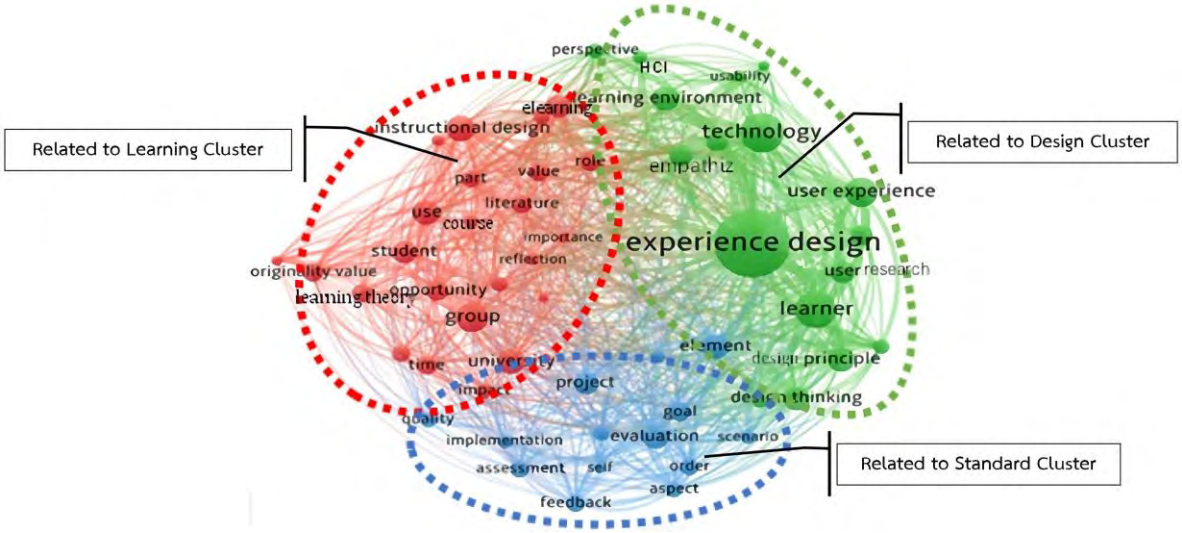

Figure 7. Cluster of LXD dimensions with text mining to visualization network by VOSviewer (Source: Authors)

When synthesizing word groups and the frequency of keyword groups in each dimension, principles and concepts used in every dimension can be grouped, as follows:

1. Green group illustrates design and technology dimensions aimed at referring to user experience and design thinking on technology context.
2. Red group illustrates the education and learning management dimension that refers to instructional design principles and learning theory.
3. Blue group illustrates measures standards and evaluation aim to refer to project evaluation principles and learning assessment to provide feedback, as shown in **Table 1**.

Table 1. Examples of the most key term in each cluster from SCOPUS

Green cluster key term		Occurrence	Red cluster key term		Occurrence	Blue cluster key term		Occurrence
Key term related to design dimension	Experience design	74	Key term related to learning/dimension	Instruction design	29	Key term related to standard dimension	Evaluation	26
	Technology	43		Learning theory	28		Project	25
	Learner	40		Student	27		Goal	21
	User experience	32		Group	27		Feedback	19
	Design thinking	27		E-learning	25		Assessment	18
	Design principle	27		Opportunity	22		Quality	16
	Empathize	25		University	20		Implementation	15
	User research	24		Course	19		Scenario	11

When analyzing keywords of each referenced dimension, the researcher synthesized the concepts of the relevant principles. To see an overview of sub-dimensional components, consideration is needed, including

1. UXD principles are the design process of interaction between users and products or services focusing on user experience quality with the concept of "experience" (Emmanuel et al., 2021; Kraus, 2017; Stevens, 2021; Troop et al., 2020), and dimensions needed to emphasize, including
   (1) user component (user) or the user's perception through analyzing user profiles such as gender, age, living environment, education, occupation, interests, and sociocultural background. In addition, the analysis of the cognitive mechanisms of the brain and neuroscience in human perception of objects,
   (2) product component (product), by creating the current product must intelligently respond to the user, and
   (3) context component (context of use) that emphasize on being in a specific interaction situation and will influence human cognitive and sustained cognition (Bongard-Blanchy & Bouchard, 2014; Konstantakis et al., 2018; Kraus, 2017; Roto, 2019; Stern, 2014).
2. Principles of instruction design is a systematic approach that involves analysis and planning for designing a process for teaching and learning activities appropriately specific to the objectives, context, and learners so that learners can learn according to their objectives. The designer must genuinely

understand the concepts, theories, and principals involved, such as learning psychology theory, teaching science, measurement and evaluation theory, and the concept of integrating modern technology (Gagne et al., 2005; Reiser & Dempsey, 2018). Developers must consider

(1) learners,

(2) media,

(3) content/learning objectives,

(4) pedagogy, and

(5) learning assessment (Desimone, 2009; Reiser & Dempsey, 2018; Sottilare, 2018).

3. Assessment and evaluation are the heart of standard development and improvement in everything through data collected from actual conditions. Effective assessments must be planned with specific, objective-oriented, quantifiable results with feasible, reasonable, and consistent reality. The most important part of the assessment is design, compilation, analysis, and straightforward interpretation. Nowadays, insights with big data and artificial intelligence are used to analyze Learning Analytics to obtain accurate data that can lead to improvements at the right point (Joshi & Sharma, 2021; Kew & Tasir, 2022; Manocham et al., 2022; Mwakalinga & Leandry, 2021).

RQ3. How Does the LXD Process?

According to the analysis retrieved from keyword related to the principle of experience development and design process using map based on text mining to density visualization network analysis techniques, most dense expressions were in the group experience design, User experience, and design thinking. Details are shown in **Figure 8**.

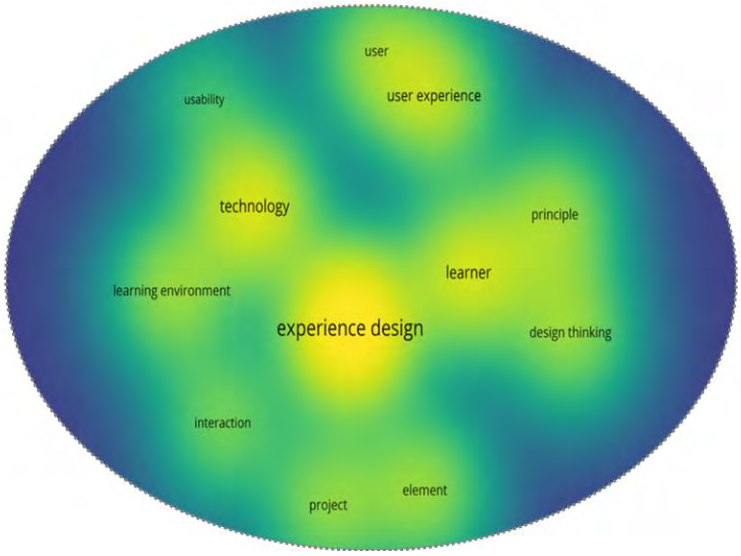

Figure 8. Most term used keyword about process or practice of LXD with text data to density visualization network by VOSviewer (Source: Authors)

DISCUSSION AND CONCLUSIONS

According to research findings, still infer LXD conceptual through the design thinking principle, which is based on human-centric design approach and focus on user research with a mixed method for empathy and better learning experiences. Moreover, that contributed to aesthetically engaged learning experiences. Consistent with West et al. (2022), improving instructional design through experiences and aesthetics by design theory will increase interest, motivation, cognition, and creativity. Furthermore, Stanford University (2022); Auernhammer and Roth (2021) reported that design thinking combines science among art, psychology, sociology, and engineering to understand people's behavior and needs to innovate with new perspectives effectively.

For dimensionality involved in LXD can be addressed in three aspects:

1. Design dimension approach focuses on UXD with technology context.
2. Learning dimension approach, which focuses on instruction design principles. As agreeable with many researchers, LXD is an interdisciplinary field of expertise, including design theory, interaction design, and learning theory such as neuroscience, cognitive psychology, and pedagogy. To build a wide variety of different contexts and settings, which transform the learner's perceptions, facilitate conceptual understanding, yield emotional qualities, and nurture the acquisition of knowledge, skills, and attitudes (Batoufflet, 2019; Chang & Kuwata, 2020; Floor, 2018; Gray et al., 2020; Schmidt & Huang, 2021; UNESCO, 2013). However, synthesizing sub-elements of main dimensions from user experience and instruction design to LXD development with six sub-elements include
   (1) learner
   (2) objective/content
   (3) media/product
   (4) context of learning
   (5) pedagogy/strategy, and
   (6) assessment (Bongard-Blanchy & Bouchard, 2014; Desimone, 2009; Konstantakis et al., 2018; Kraus, 2017; Reiser & Dempsey, 2018; Roto, 2019; Sottilare, 2018; Stern, 2014) (**Figure 9**).

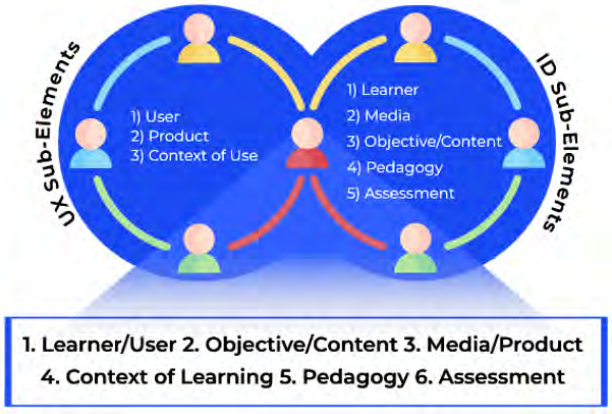

Figure 9. A synthesis of UX & ID elements to LX sub-elements (Source: Authors)

Moreover, this study has discovered a new dimension,

3. Standard dimension approach, which focuses on assessing and evaluating learning goals and project management since it improves learning outcomes. This is the main goal of creating a standard for evaluation. The analysis is consistent with Li and Jiang (2021) and Soulis et al. (2017) who stated that standards and evaluations are essential for developing and improving user experience. Especially nowadays, big data and learning analytic technology are used to help analyze the actual learner's in-depth behavior, leading to further development and improvement of learning efficiency.

As for the process, LXD is influenced by UXD process, which is based on a human-centered and design thinking. Currently, the focus is on deep empathy techniques for mixed method research. This analysis is in line with many scholars such as Li et al. (2022), Schmidt and Huang (2021), Schmidt and Tawfik (2022), and Thurber (2021), all stated that LXD practice informed by UXD methods and design thinking for learning contexts. Such concepts are related to human-centered design that considers the mental and emotional quality of learner mentality or emotional well-being in digital learning to create a good experience and continually profound learning in the long run. This differs from traditional instructional design, which focuses solely on learning outcomes based on curriculum objectives. Furthermore, according to Raynis (2018), Kilgore (2016) certainly, it is empirically evident that the terms "instructional" are content focused, whereas the term "learning experience" focuses on the involvement of the learner/user.

However, from further collecting and synthesizing the LXD process, LXD process consisted of five steps:

1. Research, both learner as user research and learning goals with mixed method, qualitatively and quantitatively for in-depth understanding, and define solutions derived from research.

2. Design with Ideate by brainstorming and creative process about specific learning activities and experiences suitable for the group of learners and learning objectives.
3. Develop a prototype by creating a prototype, both activities experience context and learning tools.
4. Validity testing to analyze efficiency and effectiveness. Also, consider whether it can solve problems and respond to learning.
5. Launch and follow-up actual use by enhancing awareness, understanding, and confidence in use while updating modern technologies such as AI and Big data analytics to constantly evaluate (Austin, 2019; Babich, 2020; Floor, 2018; Malamed, 2018; Remiker & Hourigan, 2019; Skill Source e-Learning, 2022).

In conclusion, LXD conceptual to practice has three dimensions include design dimension approach, Learning dimension approach, and standard dimension approach. Moreover, the study can specify LXD sub-dimension and process for practice, as shown in **Figure 10**.

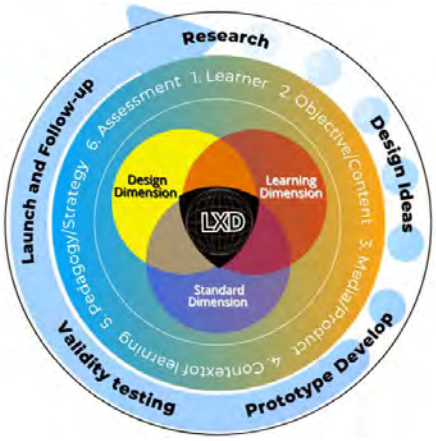

Figure 10. Conceptual to practice model of LXD (Source: Authors)

Future Research and Contributions

For completeness, this research should be further studied to identify a framework for operational competency as a learning experience designer. Moreover, there should be participation from the public and private sectors to develop professional standards related to the design of learning ecosystems in the context of a digital society. The effective study will lead to the creation of a lifelong learning society in the next normal.

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Declaration of interest: Authors declare no competing interest.

Data availability: Data generated or analyzed during this study are available from the authors on request.

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