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Human–AI Co-Creation in Edtech Content Development: A Systematic Review and Conceptual Framework

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Abstract

This systematic overview was a literature review of peer-reviewed studies on Human AI co-creation in EdTech content creation to generalize the co-creation of digital learning materials by artificial intelligence and human expertise. The review has been based on multidisciplinary sources within the field of AI, education, and human-computer interaction, identifying the most important technologies (particularly generative AI, adaptive systems, and learning analytics), human roles (content design, quality control, pedagogy, and creative input), and their interaction. The study condensed frequent patterns and issues, such as the necessity of pedagogical alignment, ethical control, and individualised learning based on the learner, with the help of structured searching, PRISMA-based screening, and thematic analysis. It is on these insights that a conceptual framework was suggested to describe the interaction between human judgment, creativity, and instructional goals with the scalability and data-driven abilities of AI to generate effective, inclusive, and adaptive educational content, which would further the theory and practice in AI-enabled digital education.

Keywords: Human–AI Co-creation, Educational Technology, Generative Artificial Intelligence, Digital Content Development, Adaptive Learning Systems

1. INTRODUCTION

The high rate of the development of the artificial intelligence has radically changed the educational field and especially the creation of the digital learning content. The latest EdTech services are more and more based on the usage of AI tools, including generative model, adaptive learning systems, and learning analytics, to create, customize, and distribute educational content. Meanwhile, human educators, instructional designers and subject experts are still playing a vital role in making sure that the content is sound pedagogically, ethically, and that it meets the needs of the learners. This transforming relationship has led to the idea of the Human-AI co-creation which involves humans and intelligent systems joining forces to create and improve the educational materials.

Human-AI co-creation in EdTech is an evolution of entirely human-based content creation or entirely automated content creation to a hybrid content creation model that is a combination of both. AI is fast, scalable, and data-driven, allowing it to create learning content and custom learning trajectories quickly. On the contrary, humans offer frameworked insights, innovation, emotional acuity and instructional discretion, which are necessary in significant learning encounters. Combined, such collaboration enables educational material to become more adaptable, interactive, and receptive to various learners, thus, becoming more effective and inclusive.

Although the use of AI in the development of educational content is becoming increasingly common, currently the available studies are rather scattered and cross-disciplinary, that is, within the field of artificial intelligence, education, human-computer interaction, and instructional design. Most studies are either devoted to technical abilities of AI or the results of pedagogy, but less of them refer to the collaboration between humans and AI as co-creators. This absence of a unified point of view complicates comprehending the dynamics, roles, issues, and opportunities of collaborative content development in EdTech settings.

The present research paper undertakes a methodical examination of the literature available on the subject to determine trend, technologies, and human factors in Human-AI co-creation in the development of EdTech content. Depending on the evidence synthesized, it suggests a conceptual framework that works to clarify how human expertise and AI systems can interact

to create useful, customized and scalable educational content. Having synthesized scattered research into a single logical model, this study will make contributions both to theory and practice in AI-driven digital education.

2. REVIEW OF LITERATURE

Chiu et al. (2021) designed and tested a pre-tertiary artificial intelligence course and sought to train learners to work in an AI-driven world. Their research had been targeted at the implementation of AI concepts into the education of schools with the support of an organized curriculum design. The researchers had discovered that the exposure to AI knowledge at an early stage had enhanced the computational thinking, problem-solving skills, and intelligent systems knowledge, in the students. The research had further highlighted the relevance of human mentoring in deciphering AI concepts, which implied that successful learning had been undertaken when instructors and computer programs had collaborated in assisting the student participation and understanding.

Guldberg et al. (2021) investigated knowledge co-creation in an international community of practice in the field of autism education and applied the model of value creation. They had researched the way in which educators, researchers and practitioners had produced and distributed knowledge in various locations and contexts of practice. The research had revealed that co-creation had helped participants to come up with more inclusive and productive educational practices. The authors had concluded that learning communities had been further enhanced by formal collaboration and common digital platforms that reflected ways in which human collaboration with the assistance of technology had brought about significant educational change.

Hutson and Plate (2023) explored the topic of Human-AI collaboration in smart education, specifically, applied learning and metacognition. Their works had refocused the role of AI as not a tool but as a partner in active learning. The research had demonstrated that AI systems had assisted learners in giving adaptive feedback, giving personalized guidance, and reflective prompts, whereas humans had continued to be in charge of critical thinking and making judgments and moral decisions. The authors had stressed that incorporation of AI in learning spaces had improved self-awareness and learning strategies of students with the help of human mentoring, which supported the significance of Human-AI co-creation in learning facilities.

Knote et al. (2020) discussed the concept of value co-creation in smart services in the view of a functional affordance, which concerns smart personal assistants. This was because their research had discussed how this value was created by the interaction of users and intelligent systems, automation, and adaptive features. The authors had established that smart assistants had helped users to co-produce services by responding to needs, learning behaviour and providing contextual support. The research had shown that successful co-creation had been achieved in case the capabilities of the system and the intentions of the human being had been aligned, and the collaborative interaction between the human and AI-based technologies was crucial.

Ligthart et al. (2023) explored the part played by co-creation in promoting child-robot co-regulation. Their studies had been on how children and social robots had jointly regulated emotions and cognition in the process of learning and interacting. The results had revealed that the co-creation strategies had enhanced the participation, confidence and emotional stability, which enabled the robots to facilitate the learning processes of kids in a more efficient manner. The authors had settled on the idea that meaningful human-robot interaction had required shared control and mutually adaptive interaction, which made co-creative interaction significant in education and development.

3. RESEARCH METHODOLOGY

The study employed a systematic literature review to examine peer-reviewed studies related to Human -AI co-creation in EdTech. Structured search and screening were followed to select

relevant studies and a conceptual framework explaining the collaboration of man and AI in the development of content was developed using thematic analysis.

3.1. Research Design

The research study used systematic literature review with conceptual framework development as the major research design. This method was chosen so that there would be a full and clear synthesis of the available academic literature on the subject of Human-AI co-creation in EdTech content development. As the field combines the artificial intelligence, pedagogy, instructional design and human-computer interaction, a systematic review allowed to identify, screen and assess multidisciplinary research in a systematic manner. The theoretical framework was constructed through the synthesis of the information that was gained by studying the literature, which makes the study proceed beyond the description and to the theoretical explanation.

3.2. Nature of the Study

It was a qualitative, descriptive, and analytical research. It hinged on the use of secondary data and focused on interpreting, comparing, and synthesizing the research as opposed to coming up with new empirical data. The research aimed at comprehending the interaction between human expertise and artificial intelligence when designing, adapting, and refining digital learning content and conceptualizing the complex interplay between the two into a coherent theoretical framework.

3.3. Sources of Data

The study data were collected in peer-reviewed journals, conference papers, academic books, and official research reports on the topics of artificial intelligence, educational technology, digital pedagogy, and instructional design. Large academic databases like Scopus, Web of Science, IEEE Xplore, ScienceDirect, springerlink, ERIC and Google scholar were consulted to provide an extensive coverage of different disciplines and access to high-quality research. These sources were credible and current sources of evidence regarding the role of AI in the development of education material.

3.4. Search Strategy

A search conceptualization was systematic in the form of key word search strategy. The keywords and phrases included: Human -AI collaboration in education, AI-assisted content development, EdTech and artificial intelligence, generative AI in learning materials, co-creation in educational technology, etc. The keywords were typed into the academic databases with the help of such operators as AND OR to narrow the search and reduce the irrelevant results to the maximum, so that the studies found in the databases were directly related to the subject of the study.

3.5. Inclusion and Exclusion Criteria

The inclusion and exclusion criteria were used in order to keep the relevance and quality of the review. Peer-reviewed articles published within the period of 2018 and 2023 and in English were only considered. The works chosen needed to be based on AI-assisted learning content development or human-AI interaction in the context of learning. Any study that was not related to education, involved a human being or otherwise, and was not an academic study was not considered. The filtering process was necessary to ensure that the final dataset contained the most significant and plausible research on the subject.

3.6. Screening and Selection Process

The research was selected according to the PRISMA principles as to guarantee transparency and methodological rigor. At the beginning, titles and abstracts were screened to filter out the irrelevant studies. Articles deemed to be relevant were then screened out to their full text to ensure that they conformed to the research objectives. Only the studies satisfying all the inclusion criteria were selected to undergo analysis such that the end body of literature would be focused and academically sound.

3.7. Data Extraction

The main information was systematized and selected out of every chosen article and included the authors, year of publication, the focus of the research, the type of AI tool, the role of humans in the development of the content, the application domain of the EdTech, and the most important findings. This hierarchical extraction allowed comparative consistency across studies and helped to find similar trends, themes, and theoretical ideas applicable to Human-AI co-creation.

3.8. Data Analysis Technique

Thematic content analysis was used in the analysis of the data collected. The reviewed articles were categorized and coded into broad themes including AI-assisted instructional design, human decision-making in AI-generated content, personalization and adaptivity, and creativity in co-creation, and ethical and pedagogical implications. The process enabled the study to leave the individual findings behind and find out general trends and relationships in literature.

3.9. Development of Conceptual Framework

A conceptual framework explaining the dynamics of Human-AI co-creation in the process of EdTech content development was developed based on the thematic analysis and the identification of the relationships occurring. The diagram shows the dynamics between human experience, pedagogical objectives and creativity and AI technology (generative models, adaptive systems and analytics software) to generate personalized, scalable and effective learning content.

3.10. Reliability and Validity

The quality of the academic databases and the strict inclusion criteria, as well as the cross-checking of the themes between studies, ensured reliability and validity. Its conceptual framework was based on established theories of human-computer interaction, learning sciences, and AI-assisted pedagogy, which make the study more consistent and credible theoretically.

4. RESULT AND DISCUSSION

It is demonstrated that the research on Human-AI co-creation in EdTech is steadily growing since 2018 until 2023, and the most popular ones are generative and adaptive AI tools, where humans are involved in the design, quality control, and in pedagogy. The findings in combination prove that the crucial factor in creating EdTech contents is the close collaboration between human skills and AI technologies.

Table 4.1 shows the distribution of studies that were considered in the systematic review during 2018-23. It presents every year of publication and how many publications were identified in that specific year, thus giving a historical perspective of the literature coverage that has been used to analyze Human co-creation with AI in EdTech content development.

Table 4.1: Year-wise Distribution of Studies (2018–2023)

Year	Number of Studies
2018	5
2019	8
2020	12
2021	18
2022	22
2023	26

According to the table 4.1, one can observe an upward tendency in the number of studies, with 5 studies in 2018 and 26 in 2023, which points to a definite increase in scholarly interest in Human to AI co-creation in EdTech. Such steady expansion is an indicator that the field has been becoming more and more relevant over the years, especially since 2020 when the number of studies has increased significantly. This trend indicates the accelerating nature of AI-based educational technologies, as well as the increasing awareness of collaborative human-AI

practices in the content development discipline, as the field begins to enter its maturity and shaping it to the context of modern digital education.

Table 4.2 displays the prevalence of various AI tools in the development of EdTech contents as the reviewed research indicated. It enumerates different types of AI technologies and their respective frequencies, which gives an overview of the types of tools that are being discussed in connection to Human-AI co-creation.

Table 4.2: Distribution of AI Tools Used

AI Tool	Frequency
Generative AI	40
Adaptive Learning Systems	28
Learning Analytics	22
Chatbots	18
Intelligent Tutoring Systems	12

Table 4.2 data indicate that Generative AI was highest in frequency (40), Adaptive Learning Systems (28), Learning Analytics (22), Chatbots (18), and Intelligent Tutoring Systems (12). This distribution shows that generative technologies are the most used tools in the Human and AI co-creation of EdTech content development, which is mainly due to the fact that they generate instructional texts, quizzes, explanations, and multimedia contents more efficiently. High usage of adaptive learning systems and learning analytics also indicates a high interest in personalization and the refinement of the content based on the data, and the utilization of chatbots and intelligent tutoring systems reflects the increased role of AI in facilitating the interaction, guidance, and feedback of the learners. Collectively, these findings imply that the implementation of Human–AI co-creation in EdTech is motivated by a mix of content creation, personalization of learners, and interactive support technologies.

Table 4.3 shows how various human positions are divided in Human-AI co-creation process in EdTech content development. It classifies the nature of human contribution which includes content design, quality control, pedagogical planning and creative input and gives the percentage contribution of each of the roles in the total process of co-creation.

Table 4.3: Role of Humans in Co-creation

Human Role	Percentage
Content Designer	35%
Quality Controller	25%
Pedagogical Planner	20%
Creative Contributor	20%

As indicated in the table 4.3, content designers took the highest percentage of 35, quality controllers occupied the second place of 25, and pedagogical planners and creative contributors occupied the same positions of 20 each. It means that humans are the key actors in organizing and formatting AI-created educational content and make sure that the content is pedagogically valid, precise, and matches the learning goals. The high status of quality control reveals the need to use human control in authenticating AI outputs, whereas the existence of pedagogical planning and creative contribution shows that educational intent and creativity are highly human-centered in the Human-AI co-creation paradigm.

5. CONCLUSION

The systematic review revealed that Human-AI co-creation is now one of the key paradigms in the development of EdTech content because generative and adaptive AI technologies possess complementary advantages and human pedagogical experience. In the analyzed literature, AI demonstrated the ability to improve scalability, personalization and efficiency of learning material creation, whereas humans participated in improving the quality of the instruction, its creative and ethical aspects as well as its alignment with the goals of the teaching. The number

of publications growth per year and the prevalence of the generative and adaptive tools proved the growing significance of collaborative AI in digital learning. These findings were integrated in the proposed conceptual framework by clarifying the interactions between human roles in design, quality control, pedagogy, and creativity and AI abilities to design practical and inclusive learning experiences and provide a theoretically supported and practically helpful model to develop AI-enabled education.

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