Journal of Contemporary Human Insights
Vol.01 No.01 2026

Education in Transition: A Review of Digital Learning and Its Effects on Social Development

Synne Myreboe[1*], Hans Schildermans[2]

[1*]Department of Education, University of Vienna, Wien, Austria. Email: synne.myreboe@univie.ac.at
[2]Department of Education, University of Vienna, Wien, Austria

ABSTRACT

This critical analysis looks at the role of digital learning in the social development of modern educational practices. Although the existing scholarship has paid much attention to the academic performance, engagement, and access, the social implications of online, blended, and hybrid learning are not synthesised as much as possible. The article fills this gap by examining the ways that digital learning transforms interaction, belonging, communication, collaboration and identity. The article constructs a critical literature review of digital learning and social development. It conceptualises digital learning and social development first, then explores digital learning as a shifting social space, and finally generalises evidence on the positive impacts of digital learning, the dangers of digital learning, and how social outcomes are mediated. The review demonstrates that there are no consistently positive or consistently negative impacts of digital learning on social development. Learning environments that are deliberately designed and promoted can help it to increase communication, collaboration, inclusion, and digital social competencies. However, it can also contribute to social isolation, weaker peer bonds, reduced belonging, and unequal participation where pedagogical, institutional, and socioeconomic conditions are inadequate. The findings remain mixed because social outcomes are highly context-dependent and shaped by the interaction of pedagogy, technology, learner characteristics, and access. The article contributes a socially focused synthesis of digital learning research by positioning digital learning not only as a mode of instructional delivery but as a transformed social environment. It argues for a more socially responsive approach to digital education in research, policy, and practice.

Keywords:

Digital learning; social development; online learning; social presence

1. INTRODUCTION

Digital learning no longer faces the periphery of education but has occupied a central place in modern education and learning. In schools, universities, and professional learning settings, access to content, communication, collaboration, and assessment is now mediated by digital platforms in more visible ways. This growth has been fuelled by both long-term technological growth and structural changes within the delivery of education, institutional priorities, and learner expectations. Online and blended learning have, over time, been viewed not as substitutes for conventional education, but as an established part of the present-day education system. There were already indications in previous meta-analytic studies that online and blended learning might yield significant educational value when conditions were right, and that instructional design was intentional, and that interaction was well facilitated [1].

Simultaneously, there has been conceptual ambiguity regarding the emergence of digital learning. The terms online learning, e-learning, blended learning, hybrid learning and distance learning are not always precise and consistent in how they are used in literature. The importance of this difference of definition is that various types of digital learning may be characterised by various degrees of technological mediation, learner autonomy, instructional structure, and social interaction. A methodical overview of online learning definitions revealed that the discipline has never been conceptually uniform, which complicates the comparison of studies and obscures some significant differences between the educational formats [2]. The same issues are echoed in more comprehensive surveys of research on online teaching and learning, which indicate that the area is very broad and rapidly developing, yet not necessarily conceptually unified [3]. With the increasing integration of digital learning into mainstream education, defining what the term entails is thus a requisite place to begin any discussion of the impacts thereof.

The severity of this problem escalated significantly during the COVID-19 pandemic, when all institutions worldwide suddenly switched to distance forms of teaching. It was a time when digital learning received more attention than ever before, yet it was also a time when the need to distinguish between deliberately designed online learning and emergency solutions to the crisis emerged. Emergency remote teaching was coined to indicate the changes in instruction delivery to digital forms that occurred due to the emergency situations, and not the planned design processes that are characteristic of high-quality online learning [4]. This difference is important as most of the issues related to pandemic-era digital learning were not dictated by the nature of digital learning, but rather by the pace, uncertainty, and unpreparedness with which it was executed. Scholars who were writing in this timeframe highlighted the fact that emergency remote teaching is not to be confused with models of online learning, since this may result in misleading results on what digital learning is actually capable of and what it cannot [5].

Despite that, the pandemic served as a point of shift in the sphere of education because it turned digital learning into an unavoidable and universal phenomenon. Online learning seemed to provide a viable option to others, capable of maintaining continuity, flexibility, and access in a crisis situation [6]. To other people, it was the same time that revealed the weaknesses of the educational systems, with inequities in digital access, disparities in teacher readiness, and the constraints of moving the face-to-face practices into the virtual space without proper redesign [7]. These arguments revealed that digital learning cannot be limited to technological possibilities or academic outcomes. It also carries with it significant implications to the role of learners in educational settings in terms of how they engage, interact, communicate and socialise.

This social aspect has been overlooked in many instances in comparison to issues of effectiveness, engagement and achievement. A substantial body of the literature in digital learning has focused on performance, completion, satisfaction, and access, and social development has been indirectly addressed or a secondary concern. The recent systematic work still emphasises the high value

that is attached to performance and engagement when researching online learning, although these settings also transform the social experience of students in significant ways [8]. However, education is never purely an academic process. It is also a social process whereby learners acquire communication skills, collaborative abilities, identity, belonging, and the capacity to engage in communication in a significant manner within communities. As the mediation of learning becomes more and more dependent upon screens, platforms, and distributed forms of interaction, these social aspects can be altered in ways that are more closely subject to critical examination.

This review is based on the perception that digital learning must be studied not as a pedagogical or technical progress, but as a social environment that changes. The transition of physical classrooms to online, blended, and hybrid environments changes the arrangements through which learners experience teachers, peers, and institutions. It alters the time and nature of interaction, reallocates participation on digital media, and changes the circumstances in which belonging and collaboration are created. Such changes can result in new possibilities of inclusion, enlarged communication, and novel social skills, yet they can also augment isolation, deteriorate peer bonds, and replicate existing disparities. To comprehend these possibilities, it is important to leave behind naive assertions that digital learning is either a solution to the educational problems or a menace to real human interaction.

In this regard, this review will explore the impact of digital learning on social development in the contemporary education setting. It aims to integrate the current research on the social consequences of online, blended and digitally mediated learning spaces, and it especially focuses on interaction, belonging, communication, collaboration, and identity. The main thesis pursued in this article is that there is no unique or standard social impact of digital learning. Instead, its impact on social development depends upon pedagogical design, institutional support, and characteristics of the learners, and the social conditions outside of which it is situated. Through a critical evaluation of this relationship, it is hoped that the article will help to add to a more balanced and conceptually informed view of education in transition.

2. CONCEPTUALISING DIGITAL LEARNING AND SOCIAL DEVELOPMENT

Digital learning is best perceived as a general term that describes a set of technology-mediated education, which includes online, blended, and hybrid learning. Digital learning, in its broadest use, is any instructional process whereby digital platforms, tools of communication, and networked resources influence the manner in which teaching, interaction and participation happen. Under this general label, fully online learning can be understood as the education that is provided mainly by means of digital tools, whereas blended learning is the type of education where face-to-face learning is combined with the elements of online learning in a consciously designed format, and hybrid education can be understood as the model of education where both physical and online learning are provided in the same format or in an interchangeable format [9]. These differences matter since they suggest that digital learning is not a unique, homogeneous model, but a spectrum of educational configurations that differ in terms of their mediation, interaction, and spatial flexibility. Table 1 summarises key concepts that are used in this review.

Table 1. Key Concepts Used in the Review

Concept	Working Definition in This Review	Main Dimensions
Digital learning	Technology-mediated learning that includes online, blended, and hybrid modes of education	Delivery mode, interaction structure, platform use, flexibility

Online learning	Learning is conducted primarily through digital platforms without regular physical classroom attendance	Virtual interaction, remote access, asynchronous/synchronous communication
Blended learning	Learning that intentionally combines face-to-face and online components	Integration of modalities, instructional design, and continuity across settings
Hybrid learning	Learning in which students may participate in person and online simultaneously or interchangeably	Co-presence across modalities, participation equity, and technological coordination
Social development	The development of capacities for interaction, belonging, communication, collaboration, and identity formation in educational settings	Peer relations, social competence, connectedness, participation, identity
Social presence	The extent to which learners experience others as real, available, and relationally connected in mediated environments	Immediacy, intimacy, visibility, relational connection
Belonging	Learners' sense of inclusion, recognition, and membership within a learning community	Acceptance, connectedness, trust, participation
Digital social competencies	Social and communicative abilities needed for effective participation in digital environments	Online communication, collaboration, etiquette, mediated interaction

One of the core approaches to comprehending digital learning is by the form of interaction that it facilitates. The interaction framework by Moore is particularly applicable in this case because it defines the learner-content, learner-instructor, and learner-learner interaction as the main dimensions of distance education [10]. This opinion allows us to see that digital learning cannot be narrowed down to technological delivery. The educational and developmental importance of these types of interaction rests in the organisation, support, and experience of these forms of interaction. In systems terms, distance and digital education also entail the liaison connection between technologies, pedagogies, institutional arrangements, and needs of the learners, but not the movement of teaching between the physical and virtual space [11]. Digital learning is to be understood, however, not merely as a technical innovation, but as a remodelling of the educational environment itself.

In this review, social development is perceived as a multidimensional process, which entails the development of capacities and dispositions that help learners to engage effectively and meaningfully in social life. These are interaction, communication, collaboration, belonging and identity formation. Interaction is the rate and the nature of the interaction in which learners interact with others. Communication does not just include verbal expression but also the skill to read and act in mediated space. Collaboration deals with collective problem-solving, support, and knowledge building. Belonging is a feeling of inclusion, acknowledgement, and affiliation of learners with their peers, instructors and institutions. The term identity can be described as how learners learn to define themselves as social, academic, and more digital members of educational communities [12]. These dimensions are central in the digital context, but are mediated by the possibilities and limitations of screens, platforms, timing, visibility, and technological access.

A number of theoretical traditions are used to explain the connection between social development and learning environments. The sociocultural theory indicates that learning and development are products of socially mediated activity, and interaction has a constitutive as opposed to peripheral role in cognitive and social development [13]. The social learning theory also emphasises the role of observation, modeling and reciprocal interaction in influencing behaviour and social competence [14]. This view is extended by ecological theory, which places development in the context of nested systems, which implies that social outcomes of learners are not only affected by classroom interaction but also by family, institutional, technological, and general societal conditions [15]. Collectively, these theories justify the belief that digital learning environments influence social development since they reorganise the situations where interaction, support, and participation take place.

More precisely, the theories that are created in the framework of online education offer helpful conceptual instruments to study these dynamics. The Community of Inquiry framework has played a significant role in demonstrating how meaningful online learning occurs through the interplay of cognitive presence, teaching presence, and social presence, and social presence represents how far the participants perceive each other as real and relationally accessible in mediated contexts [9], [16]. The social presence theory also explains the role of immediacy, intimacy and interpersonal connection in determining the quality of online learning experiences, and its subsequent development can be attributed to the fact that sociality is increasingly being seen as the core of digital education and not an incidental part of online learning [17]. It is supported by empirical studies, which demonstrate that a high social presence has a positive correlation with student satisfaction and learning in online learning [18]. Figure 1 shows the conceptual relationships that have been used to guide this review.

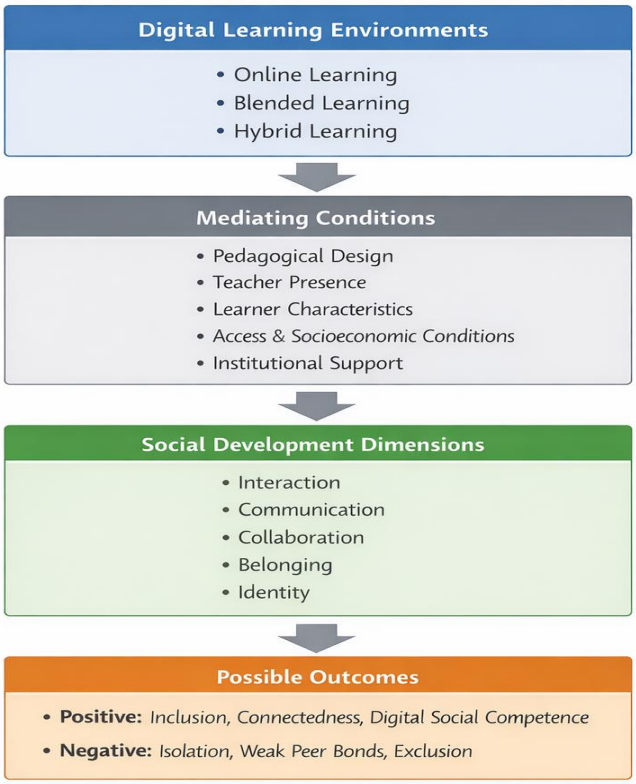

Figure 1. Conceptual Framework of Digital Learning and Social Development

Combined, these views provide a clear conceptual base for the current review. Digital learning is not only a form of content delivery, but social development is not an accidental product of education. Instead, the digital learning spaces actively define the nature of interaction,

participation and identity within which social development occurs. This knowledge allows for analysing the benefits as well as the threats of digital education as a factor that contributes to the social development of learners.

3. DIGITAL LEARNING AS A CHANGING SOCIAL ENVIRONMENT

Digital learning has changed education from a place-based activity to a more mediated social space. The development of the use of digital tools to deliver content is not the only aspect of this transformation, but it modifies the arrangement of the classroom interaction, the patterns of participation that learners can enjoy, and the relationship between the teacher, peers, and institutions. The social environment of learning is no longer as determined by co-presence as it is by the design of communication, engagement, and access as educational activity moves across physical and digital environments.

Reorganisation of classroom interaction and participation is one of the largest transformations that digital learning brings about. Physical co-location, physical proximity, and visibility commonly define immediate interaction in a face-to-face environment. Participation can be spontaneous in the form of discussion, gesture, observation and informal peer exchange. In digital settings, on the contrary, it is the platforms, interfaces, and modes of communication that filter participation and transform the way learners interact with each other and with the instructional content. Participation opportunities can be extended by educational technology, which in turn will be effective only in the case of the arrangement and promotion of engagement in the learning environment [19]. Participation online is not merely a digital version of classroom participation and may need alternative means of motivation, self-regulation, and communication. It can be seen in the studies of online engagement where the behavioural, emotional, cognitive, and social aspects of engagement are put in the spotlight instead of attendance or accomplishment of the tasks [20].

Of particular significance is the design of the learning environment since digital spaces can either facilitate or limit meaningful interaction. The strategies of deliberate engagement, such as effective communication, group work, timely feedback, and a chance to interact with educators and peers, are appreciated by students in online environments [21]. Similarly, the characteristics of course design have a strong impact on student results, which implies that online engagement is not only affected by individual performance but also by the way activities, materials, and other communication means in a particular course are managed [22]. The instructional design choice that influences the social aspect of digital learning is, hence, whether learners will feel connected, present, and included or, instead, feel fragmented and distanced.

Significant variations are also revealed within physical, blended and fully digital learning spaces. Blended learning takes a middle ground position in that it combines face-to-face instruction with the online elements in an intentional way. Instead of crowding out the face-to-face interaction in a classroom, this model aims to complement it with the immediacy of the face-to-face interaction and the flexibility of digital access [23]. In fully online learning, in turn, mediated forms of interaction are much more important, and communication is maintained by means of synchronous or asynchronous channels. These two modes generate different social conditions. Immediacy, quick feedback, and a greater experience of shared presence can be achieved through synchronous learning, whereas asynchronous learning provides flexibility, time to think and a wider range of access to learners with different schedules and circumstances [24]. These formats influence participation in different ways, and neither one is better than the other; the social impacts of each are determined by context, purpose, and design.

New scholarship also demonstrates that hybrid and blended spaces bring new complexities into the learning environment. In hybrid classes with a synchronous mode, in which some students attend in-person, and others attend remotely, interaction is not balanced and may be hard to facilitate, which raises the issue of equity,

presence, and inclusion in participation formats [25]. On the same note, the online aspect of blended learning is fraught with enduring issues pertaining to communication, coordination, and preparedness of the learner. This means that the blend of modalities does not necessarily create a cohesive social space [26]. These results indicate that digital learning spaces are to be regarded as socially differentiated spaces where the mode of participation directly leads to the relational experience.

These environments evolve and change, as well as the place of teachers, peers and institutions. In the digital environment, teachers are no longer content experts or classroom managers but must also become the facilitators of interaction, the designers of engagement, and the organisers of presence through mediated channels [21]. Peers also become increasingly more central to maintain connectedness since student interaction is often based on deliberately created collusion and exchange possibilities as opposed to accidental classroom interaction. At the institutional level, there are support structures, digital infrastructures and policies that are increasingly determining whether learners can attend to it in full and feel socially connected. Studies on remote learning have demonstrated that student connectedness relies not just on individual effort, but also on the provision of relevant digital tools, as well as on the availability of the relevant institutional support systems [27].

Combined, these advances suggest that digital learning should be viewed as a shifting social landscape as opposed to a technological setup. It restructures the process of participation, distinguishes the experience of learning in other modalities, and redistributes responsibility to be connected between teachers, peers and institutions. This change can be key to comprehending the potentials and the restrictions of digital education as a social development.

4. POSITIVE EFFECTS OF DIGITAL LEARNING ON SOCIAL DEVELOPMENT

Digital learning has the potential of contributing to social development in a significant manner as long as it is designed in a manner that will promote interaction, participation and connection. Although the issues of isolation and reduced face-to-face communication remain significant, the literature also shows that digital spaces can provide meaningful communication and collaboration opportunities, increase the involvement of diverse learners and introduce new forms of social competence that are gaining significance in contemporary education and society.

Among the most evident positive aspects of digital learning is its ability to increase communication and collaboration beyond the boundaries of the traditional classroom. The online environments have the potential to establish numerous forms of interaction, such as discussion groups, video-based interaction, collaborative documents, and group work mediated by platforms. When well-constructed, these opportunities may assist in the creation of a sense of questioning and relational existence amongst learners. It has been proposed in research based on the Community of Inquiry framework that well-designed online courses can develop social, cognitive and teaching presence in a manner that achieves not only learning but also interpersonal engagement [28]. On the same note, online-related engagement studies focus on the fact that the digital learning space can promote prolonged interaction in case it is supported by purposeful communication, active cooperation, and the possibility of feedback and collective participation [29].

In well-supported interaction, digital learning can also increase the perceptions of connection and satisfaction of students. Research on online learning has always indicated that the satisfaction of learners is inextricably linked to the quality of communication, the presence of instructors, and the possibility of meaningful interaction. The perceived learning and satisfaction are enhanced when the students feel supported and have an active interaction with the online environment [30]. Similarly, the level of student satisfaction in distance-learning has been attributed to the interactive exercises that lessen the distance gap and make learners feel that they have been attached to their instructors, colleagues and the course procedures [31]. Such results imply that

online learning may be more than academic assistance, as well as social validation, especially when students feel that the surroundings are not a cold and detached space.

The other digital learning opportunity that can be offered is that it can increase inclusivity and interaction between learners who may not be as vocal or comfortable in the classroom setting. The digital spaces are more likely to produce new avenues of expression regarding written discourse, asynchronous interaction and smaller-scale or more obscure interaction. The latter may be especially useful regarding students who need to have some time to think before speaking, students who experience anxiety during the live classroom discussion, and students who are less desirous to talk in the traditional classroom. Online learners can take on many different forms of participation, and these forms of participation are associated with the levels of cognitive processing, which implies that online interactions can support more expansive forms of participation, as opposed to those that can be observed during a face-to-face interaction [32]. By valuing different communicative styles and social orientations, such a capability to diversify the engagement could make the learning settings more accommodating.

Digital learning can also contribute to the cultivation of digital social skills and new types of relationships that gain more significance in learning and working life. Involvement in online education means that the students have to communicate using digital media, coordinate group work remotely, process messages without fully using the physical cues, and create presence in mediated environments. These do not constitute second-order skills; they are core types of social competence in networked societies. Online interaction is therefore about learning how to engage in an excellent, responsible, and collaborative way in the digital environment [29]. It has been demonstrated that the application of asynchronous video communication, such as, supports stronger learner social presence by enabling participants to convey tone, personality, and warm relational over text-based communication, enhancing more profound aspects of mediated connection [33].

Recent research has also indicated that such positive effects can be applied over various institutional and regional settings, even though they are expressed differently depending on the design and experience of learners. The concept of social presence has been associated with online student engagement in various learning contexts, which supports the notion that the sense of connection and interpersonal visibility are the key drivers of positive social performance in online contexts [34]. The quality of digital interaction, in collaborative online learning, also seems to be correlated with individual and group-related aspects, which means that the successful online social development depends not on how individual learners work but on how they work as members of a common community [35].

The literature as a whole indicates that digital learning can make a major positive contribution to social development as long as it is relationally structured and pedagogically scaffolded. It may enhance the scale of communicative and collaborative possibilities learners possess, create more inclusive forms of involvement, and build the digital social skills needed in contemporary learning life. These are not benefits that arise by accident because of technology as such, but rather the way digital space has been structured so as to enable human connectivity.

5. RISKS AND CHALLENGES FOR SOCIAL DEVELOPMENT

Despite the possible benefits, digital learning is a huge threat to social development, particularly when introduced quickly, unevenly, and without proper pedagogical and institutional support. The literature repeatedly evidences that online learning can destroy interpersonal relationships, reduce the quality of peer interaction, and increase the forms of exclusion that can affect the social experience of the learners. Such concerns are especially acute in cases when digital learning is not a prudent educational idea but an emergency or a restricted need.

Social isolation is one of the most common risks that is identified. Students can be less likely to experience spontaneous conversation, informal peer interaction and relationship-building that

students usually experience before, during, and after face-to-face classes in digital environments. The transition to online education in the COVID-19 era underscored the rate at which students would lose access to these daily types of connection. Emergency online learning research revealed that most learners experienced disengagement, lack of motivation, and loss of the feeling of interpersonal relationships as their learning processes entered the screen-mediated realm [36]. On a larger scale, the general examination of online education in the pandemic era highlighted that social disconnection was among the key issues connected with digitally mediated education, despite the possibility of preserving access to learning where it was accessible [37].

Such circumstances tend to lead to poorer interpersonal relationships and a lesser sense of belonging. Belonging is one of the main areas in social development since it determines how learners feel as part of an educational community, supported, and feel they have a worthwhile role. When education goes online, this illusion of belonging can be weakened, particularly when the only interaction is done through the completion of formal tasks. The longitudinal data have revealed that the transition to online learning was linked to challenges in maintaining trust, belonging, and social connectivity over the years, and social isolation has become a lasting and not a temporary situation among most learners [38]. In this regard, online education can maintain the continuity of the teaching process and, at the same time, interrupt the relational aspects of educational life that facilitate social integration.

Another issue, which is related, is the poor quality of peer interaction. Online communication may be effective; however, it cannot always be as profound, swift, and rich with emotions as in-person communication. Students can engage in online activities but still feel interaction to be fragmented, transactional or socially thin. A study of higher education learners worldwide during the pandemic reported that a significant proportion of students noted that their daily lives, emotional health, and social experiences were negatively impacted by online learning, which indicated that online involvement does not necessarily ensure social interactions [39]. The issue is not, however, the amount of interaction, but its quality. As peer exchanges are reduced, slowed down or become too instrumental, friendship, support and social growth between each other can be dampened.

Considerable problems of exclusion and inequality are also indicated in the literature. Social inequalities may be further intensified by digital learning, where students lack access to the same devices, a reliable internet connection, a quiet study environment, and family and institutional support. These disparities are not simply technical obstacles; they define who can take part in digital education to a full extent and who is excluded and marginalised. The studies of the challenges of online learning among students in the Philippines, such as one that showed the impact of poor resources, environmental distractions, and emotional strain on the capacity of learners to participate in online learning [40]. This may sequester students not only as regards academic activity but also as regards community with their peers and, therefore, limit social growth as well as educational advancement.

Such inequalities can be more pronounced in home-based digital learning, where family relations and parental engagement can have a substantial impact on the experiences of learners. The discourse of digital exclusion is rapidly revealing that social outcomes in online education depend more broadly on the household and socioeconomic context, that is, the home is an unequal continuation of the learning space itself [41]. Students who do not have supportive home conditions might not only be disadvantaged educationally but also have fewer chances to interact, be encouraged, and participate in social life.

Lastly, online education can subject the students to malicious online practices and increased psychosocial pressure. The abrupt switch to online learning has been linked to stress, uncertainty, and the inability to adjust to new learning requirements, which may have an impact on social confidence and involvement [42]. Students can also be more susceptible to exclusionary behaviour, misunderstanding or

other negative online interactions in settings where communication is depersonalised or not controlled properly. These dangers highlight the fact that access and participation are not the only factors that determine social development in digital learning, as the emotional and relational quality of the environment can also play a role. Table 2 summarises the key positive and negative social impacts found in the literature.

Table 2. Positive and Negative Effects of Digital Learning on Social Development

Dimension of Social Development	Positive Effects	Negative Effects
Communication	Expanded channels for expression, reflection, and interaction	Reduced spontaneity, weaker nonverbal communication
Collaboration	More flexible group work and cross-location teamwork	Coordination difficulties, unequal participation
Belonging	Opportunities for connection through structured online communities	Social isolation, reduced sense of membership
Participation	Greater inclusion for quieter or less vocal learners	Withdrawal, passive participation, invisibility
Identity	New forms of self-expression and digital participation	Performativity, self-consciousness, unstable learner identity
Peer relationships	Possibility of broader peer networks	Weaker interpersonal depth and informal bonding
Social inclusion	Access for geographically distant or otherwise excluded learners	Digital divide, socioeconomic exclusion, unequal access
Social safety	Moderated platforms may support respectful interaction	Cyberbullying, exclusionary behaviour, and harmful online conduct

Combined, these studies indicate that the digital learning experience can be a threat to the key aspects of social development in cases where connection, belonging, and equity are not adequately addressed. Social isolation, poorer peer relationships, unequal participation, and negative online experience are not sideline issues but the core issues in seeking to comprehend the social impacts of digitally mediated education.

6. FACTORS SHAPING SOCIAL OUTCOMES IN DIGITAL LEARNING

Social consequences of digital learning do not come from technology all by itself. Their formation is informed by a set of pedagogical, personal, and contextual conditions that shape the interaction, connection, and engagement of learners in mediated learning environments. This implies that the same digital platform may have highly diverse social outcomes based on the design of learning, learners, as well as the available support and access. These factors are critical in explaining why the literature cites both positive and negative impacts of digital learning on social development.

Pedagogical design is considered to be one of the most crucial factors. The design of activities, patterns of communication, and instructional decisions that direct learner participation are very crucial to the digital learning environment. It has been found that the characteristics of online course design have a strong impact on the student outcomes, which means that the organisation of the content, interaction, and assessment not only

impact the academic results but also the overall quality of the learning process as well [22]. Learners will be more inclined to experience a sense of connection and engagement when courses are created with well-defined interaction patterns, intended communication, and collaborative possibilities. In general, the theoretical literature on educational technology and engagement highlights that student engagement is a factor of the pedagogic integration of technology and not the availability of digital tools [19].

Closely related to pedagogical design is teacher presence. In the online environment, the role of instructors is crucial to the development of a relational supportive/socially distant environment in learners. Teacher presence does not just mean delivery of content, but also entails communication, responsiveness, encouragement, visibility and the ability to create interaction among learners. Such types of instructional presence and support are closely related to perceived learning and student satisfaction in online environments [30]. Social presence by instructors has also been found to affect student engagement in online higher education, which indicates that the capacity of the teacher to demonstrate availability, warmth, and interpersonal connection has a substantial impact on how students socialise in digital environments [43]. On the same note, a study conducted in the COVID-19 era found significant correlations between teaching presence, engagement, and the overall experience of learners online, which supports the notion that the social outcomes are determined by instructional mediation and not the automatic development of the same [44].

Social outcomes are also influenced by age, level of development, and the nature of the learner. Digital learning cannot apply equally to all learners since people have varying levels of self-regulation, confidence, motivation, and readiness to participate independently. There are students who are more equipped to handle the challenges of digital worlds, and there are those who will be unable to adapt to increased autonomy. Online education has been found to be predicted by internet self-efficacy, self-regulated learning, and patterns of interaction, and all of these elements prove that the attributes of learners play a critical role in influencing the experience of digital learning[45]. A comparable research comparing online and blended students also implies that the variation of self-regulated learning techniques impacts learning outcomes and engagement, meaning that the capacity to plan, monitor, and maintain student participation is the key to effective adaptation in mediated learning settings [46]. These are directly related to social development since learners capable of managing participation are usually in a better place to establish connections, sustain engagement, and enjoy collaborative experiences.

It is also mentioned in the literature that the social outcomes are context-specific, which suggests the significance of culture, access, and socioeconomic factors. Digital learning is never disconnected but is part of bigger social realities that influence the ability of participants to engage in full participation and under what conditions. Reliable internet access, appropriate devices, a learning environment, and institutional resources identify the opportunities of connection and belongingness of the students. In a methodological review of distance learning, the connectedness of students was found to depend heavily on the successful utilisation of digital resources and productive learning processes, with access and infrastructure playing a critical role in the definition of social experience [27]. Similarly, the existing literature review on the topic of online engagement proposes that the perceived social presence and interaction of students in different regional and contextual environments can vary, which means that cultural and institutional contexts can also influence how learners cognitively perceive and experience digital learning environments [34].

These situational factors are significant because digital learning can either reduce or increase the existing gaps. The privileged learners may be better off attending regularly, speaking confidently and having collaborative opportunities, but the learners with economic, environmental and social disadvantages may feel out of place or left out. The issue of social development in online learning is not only about personal adaptation or effective teaching, but also

about whether the larger learning ecology can enable fair interaction. Table 3 shows the most important determinants of the social outcomes in the digital learning.

Table 3. Factors Shaping Social Outcomes in Digital Learning

Factor	Description	Likely Influence on Social Development
Pedagogical design	Structure of interaction, collaboration, feedback, and activities	Can strengthen or weaken connection, participation, and belonging
Teacher presence	Instructor visibility, responsiveness, guidance, and care	Supports trust, engagement, and relational security
Learner self-regulation	Capacity to manage time, participation, and independent learning	Affects the ability to stay socially engaged in mediated settings
Digital self-efficacy	Confidence in using digital tools and participating online	Shapes willingness to communicate and collaborate
Age and developmental stage	Learners' social and cognitive maturity	Influences readiness for independent and mediated interaction
Peer dynamics	Quality of student-to-student interaction and reciprocity	Affects belonging, collaboration, and social learning
Access to technology	Availability of devices, connectivity, and digital platforms	Conditions under which students can participate consistently
Socioeconomic conditions	Household resources, study space, and support systems	Influences inclusion, continuity, and social opportunity
Institutional support	Technical, emotional, and organisational support from institutions	Helps sustain connectedness and equitable participation
Cultural context	Norms of communication, authority, and participation	Shapes how learners interpret and enact digital interaction

Put together, the literature demonstrates that in digital learning, social outcomes are formed by a combination of the interactions between the pedagogical design and the teacher presence, the characteristics of learners, and the conditions of the context. These aspects assist in explaining why digital learning does not generate consistent social impacts in environments. Rather, social development within mediated education follows the intersection of technology, pedagogy, and lived circumstances to organise the opportunities of connection, belonging, and participation.

7. CRITICAL DISCUSSION

The research on digital learning and social development displays a sphere that is simultaneously convergent and conflictual. One of the recurrent trends in the literature is that digital learning cannot be seen only as a technological transformation in the delivery of education. Instead, it is a more general change in the organisation of teaching, participation, and social experience in the field of education. Researchers have started to contend that what is meant by the digitisation of education is not merely the introduction of new technology, but the restructuring of the structures, values and practices in which education occurs [47]. Such a wider view is essential since it can be used to

understand the impact of digital learning as both enabling and restricting. Digital environments have the potential to increase access, flexibility, and participation on the one hand and, on the other hand, enhance disconnection, inequality, and pedagogical fragmentation [48].

A key trend in the literature is that it has repeatedly been found that the impact of digital learning is extremely context-sensitive. This was particularly evident during the COVID-19 era, when emergency transitions to online education revealed that there is a large range of national and local institutional preparedness, quality of pedagogies, and student experiences [49]. Technology is not the only factor that influenced the shift to remote learning, and policy choices, social disparities, and the need to respond urgently to the circumstances made it evident that the digital outcomes of learning cannot be considered outside of the context of the overall situation [50]. Similarly, mapping of studies on emergency remote teaching indicates that what was seemingly termed as online learning frequently comprised highly disparate practices, preparation, and assumptions regarding teaching and engagement [51]. This is why the literature presents both positive and negative social outcomes without necessarily coming to one concrete conclusion.

One of the tensions is associated with the ongoing propensity to perceive pedagogy and technology as two opposing forces. This kind of division has constrained explanatory capability since digital learning spaces are framed by the confounding of technological affordances, pedagogical decisions, institutional restrictions and learner practices. An entangled pedagogy argument comes in particularly handy in this case since it questions simplistic explanations that focus on the outcomes of education on one hand, or instructional method on the other [52]. This point of view supports the wider body of evidence to indicate that digital learning is not necessarily socially beneficial or socially harmful. Rather, its effects are the result of the interaction of technologies, pedagogies, and contexts.

The other important reason why results are mixed is due to the absence of conceptual uniformity in the industry. The definitions of online learning differ widely and at times overlap with each other, and the literature presents terms like online, blended, hybrid, remote, and digital learning in an indistinct manner [2]. The resulting instability of this definition does not allow easy comparison since studies can focus on very different educational arrangements when they are called the same thing. A similar problem can be found concerning social development that is frequently discussed in an indirect manner, meaning that the concepts of engagement, satisfaction, connectedness, or social presence are brought up instead of a coherent conceptual framework. Systematic reviews in the area of online teaching and learning indicate that there has been a substantial amount of research in this area, although not always of sufficient conceptual clarity or cumulative coherence [3]. The literature consequently tends to provide partial information as opposed to a comprehensive narrative of the role played by digital learning in the development of social life.

These inconsistencies are also caused by empirical gaps. The existing literature is highly research-intensive in the field of higher education, particularly during the seasons of turmoil, restricting the knowledge of the impact of digital learning on younger learners and long-term developmental mechanisms. Systematic reviews that have been conducted recently still indicate a high priority to performance and engagement results, with broader social aspects being commonly considered as secondary or captured by a small number of proxies [8]. A more developed conceptualisation of social presence and related constructs within online, hybrid and blended spaces is also required. New attempts to construct more comprehensive systems of social presence indicate that current models might not be capable of explaining the intricacy of social experience in current digitally mediated education [53]. Figure 2 shows a synthesis of the primary opportunities, risks, and influencing factors discovered in the literature.

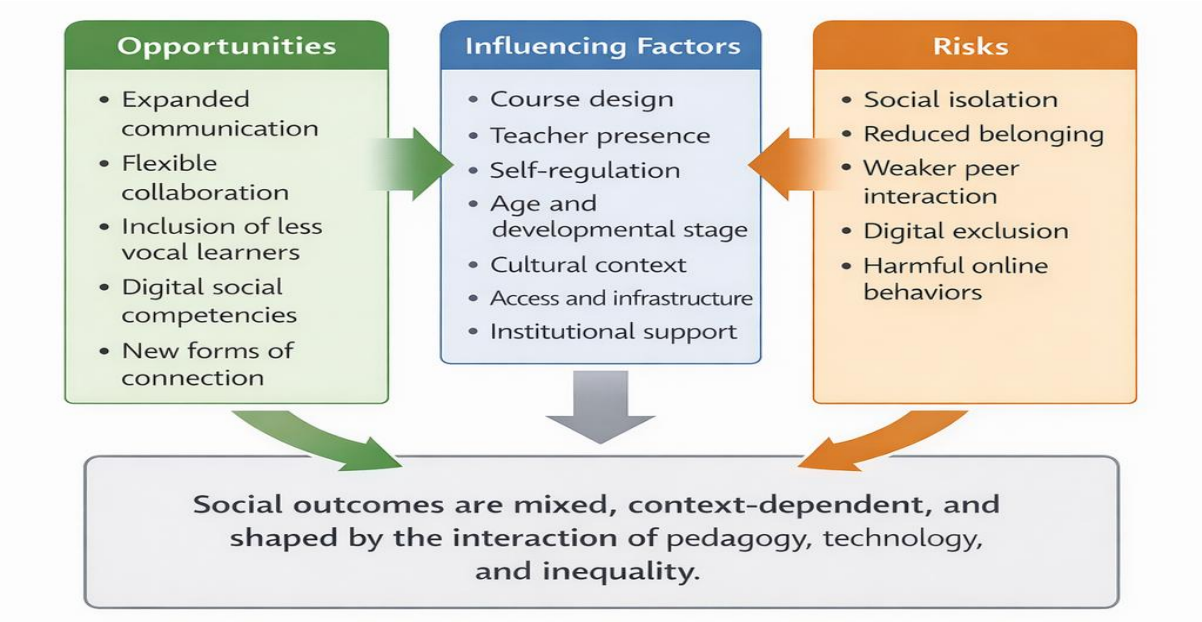

Figure 2. Synthesis Model of Opportunities, Risks, and Influencing Factors in Digital Learning

Collectively, the literature suggests one major tension: digital learning has become a well-established component of mainstream education, but its social effects have been theorised unequally and evidence-based inconsistently. It is no longer about excessively optimistic or excessively pessimistic descriptions, but conceptual integration and enough empirical depth are still missing. The most noticeable fact is that digital learning is a socially consequential condition of education, the outcomes of which are predetermined by the dependence of pedagogy, technology, situation, and inequality. This awareness provides the basis of a more critical and advanced reading of the future research and practice.

8. IMPLICATIONS FOR EDUCATION AND FUTURE RESEARCH

The findings of this review have implications in the field of teaching, policy and future scholarship. On the teaching and learning design level, the review proposes that the designing of digital learning environments should not just be considered relative to the delivery of content and performance, but also social development. Interaction, belonging, collaboration and participation should be considered as essential design considerations and not as extras. This means that a teacher should incorporate the aspects of properly structured peer communication, group work, discussion, and instructor presence in online classes. The learning activities should be designed in a manner that allows inclusiveness as well as connection, particularly where the less confident students, the less vocal, as well as the students who are easily isolated in the mediated environment, are included.There are also significant implications of the review on educational policy and institutional practice. The digital education policies should go beyond the access questions and examine the general conditions in the society that mediate the experiences of the learners. This is not only sufficient provision of the devices and internet connectivity.

Educational institutions must also ensure that the teachers receive training on not only relational but also socially responsive digital pedagogy, and students are enabled via frameworks that promote community, wellbeing and equal participation. The institutional planners should know that the digital learning environment requires investment in technological infrastructure and support systems. Without this greater commitment, digital education is likely to repeat exclusionism and disrupt social dimensions of learning.

This review can give a number of recommendations on how future research can be conducted. Further longitudinal research is required to determine the long-term impacts of continued digital learning on social development. It should also pay increased attention to the younger learners, non-Western environments, and socially diverse groups since most of the current literature remains dedicated to higher education and specific settings. Better conceptual clarity would also be beneficial to future scholarship in terms of defining digital learning and social development in more integrated forms. On the whole, future research must shift to more contextual, theoretically based, and socially oriented methods that would reflect the complexity of digital education as both a pedagogic and a social change.

9. CONCLUSION

Digital learning has emerged as one of the dominant characteristics of modern education that not only transforms the way knowledge is imparted but also how social development occurs within the learning settings. As has been demonstrated in this review, its impacts on social development are multidimensional and complex, and highly context-dependent. Online education can increase the possibilities of communication.

teamwork, inclusion, and the acquisition of new social skills. Simultaneously, it may cause weaker interpersonal relationships, worse interaction with peers, and worse exclusion in case of poor access, design, and support. The main conclusion of this review is that digital learning is not to be perceived as something that is necessarily good or harmful to social development. Its social effects are contingent on how educational technologies are implemented into pedagogical practices, institutional structures and social conditions in general. The presence of the teacher, course structure, the nature of learners, and the socioeconomic environment are decisive factors in deciding whether digital settings will generate a sense of belonging and engagement or leave people isolated and fragmented.

The other important note of the review is that the literature in the future should be more conceptually clear. It should have a more consistent definition of digital learning and good frameworks should be developed to explain social development in a manner that avoids the unequal and even contradictory results. In addition to this, longitudinal, comparative, and more contextually varied studies would be required, as such that would be in a position to capture the social implications of digitally mediated education in the long-term. In conclusion, digital learning is not a technological change only but it is a social change in education. The digital learning should be created and introduced in a manner that puts the human factor in the middle of the process of bringing in any value to the development of the learners, fairness and social engagement.

10.REFERENCES

1. B. Means, Y. Toyama, R. Murphy, and M. Baki, 'The Effectiveness of Online and Blended Learning: A Meta-Analysis of the Empirical Literature', Teachers College Record, vol. 115, no. 3, pp. 1–47, Mar. 2013, doi: 10.1177/016146811311500307.

2. V. Singh and A. Thurman, 'How Many Ways Can We Define Online Learning? A Systematic Literature Review of Definitions of Online Learning (1988-2018)', American Journal of Distance Education, vol. 33, no. 4, pp. 289–306, Oct. 2019, doi: 10.1080/08923647.2019.1663082.

3. F. Martin, T. Sun, and C. D. Westine, 'A systematic review of research on online teaching and learning from 2009 to 2018', Computers & Education, vol. 159, p. 104009, Dec. 2020, doi: 10.1016/j.compedu.2020.104009.

4. C. B. Hodges, S. Moore, B. B. Lockee, T. Trust, and M. A. Bond, 'Chapter 21 The Difference between Emergency Remote Teaching and Online Learning', Brill, 2024. doi: 10.1163/9789004702813_021.

5. A. Bozkurt and R. C. Sharma, 'Emergency remote teaching in a time of global crisis due to CoronaVirus pandemic', Asian Journal of

Distance Education, vol. 15, no. 1, pp. i–vi, Apr. 2020.

6. S. Dhawan, 'Online Learning: A Panacea in the Time of COVID-19 Crisis', Journal of Educational Technology Systems, vol. 49, no. 1, pp. 5–22, Sep. 2020, doi: 10.1177/0047239520934018.

7. F. Ferri, P. Grifoni, and T. Guzzo, 'Online Learning and Emergency Remote Teaching: Opportunities and Challenges in Emergency Situations', Societies, vol. 10, no. 4, p. 86, Dec. 2020, doi: 10.3390/soc10040086.

8. C. N. Akpen, S. Asaolu, S. Atobatele, H. Okagbue, and S. Sampson, 'Impact of online learning on student's performance and engagement: a systematic review', Discov Educ, vol. 3, no. 1, p. 205, Nov. 2024, doi: 10.1007/s44217-024-00253-0.

9. D. R. Garrison, T. Anderson, and W. Archer, 'Critical Inquiry in a Text-Based Environment: Computer Conferencing in Higher Education', The Internet and Higher Education, vol. 2, no. 2, pp. 87–105, Mar. 1999, doi: 10.1016/S1096-7516(00)00016-6.

10. M. G. Moore, 'Editorial: Three types of interaction', American Journal of Distance Education, vol. 3, no. 2, pp. 1–7, Jan. 1989, doi: 10.1080/08923648909526659.

11. M. G. Moore and G. Kearsley, 'Distance education: A systems view of online learning', 2012, Accessed: Apr.07, 2026. [Online]. Available: https://www.academia.edu/download/101704710/00131911.2020.pdf

12. E. Wenger, Communities of Practice: Learning, Meaning, and Identity. Cambridge University Press, 1999.

13. L. S. Vygotsky and M. Cole, Mind in Society: Development of Higher Psychological Processes. Harvard University Press, 1978.

14. A. Bandura and R. H. Walters, Social learning theory, vol. 1. Prentice-hall Englewood Cliffs, NJ, 1977. Accessed: Apr. 07, 2026. [Online]. Available: http://www.asecib.ase.ro/mps/Bandura_SocialLearningTheory.pdf

15. U. Bronfenbrenner, The Ecology of Human Development: Experiments by Nature and Design. Harvard University Press, 1979.

16. S. Stenbom, 'A systematic review of the Community of Inquiry survey', The Internet and Higher Education, vol. 39, pp. 22–32, Oct. 2018, doi: 10.1016/j.iheduc.2018.06.001.

17. P. R. Lowenthal, 'The Evolution and Influence of Social Presence Theory on Online Learning', in Online Education and Adult Learning: New Frontiers for Teaching Practices, IGI Global Scientific Publishing, 2010, pp. 124–139. doi: 10.4018/978-1-60566-830-7.ch010.

18. J. C. Richardson, Y. Maeda, J. Lv, and S. Caskurlu, 'Social presence in relation to students' satisfaction and learning in the online environment: A meta-analysis', Computers in Human Behavior, vol. 71, pp. 402–417, Jun. 2017, doi: 10.1016/j.chb.2017.02.001.

19. M. Bond and S. Bedenlier, 'Facilitating Student Engagement through Educational Technology: Towards a Conceptual Framework', Journal of Interactive Media in Education, vol. 2019, no. 1, 2019, Accessed: Apr. 07, 2026. [Online]. Available: https://eric.ed.gov/?id=EJ1228555

20. M. D. Dixson, 'Measuring Student Engagement in the Online Course: The Online Student Engagement Scale (OSE)', Online Learning, vol. 19, no. 4, Sep. 2015, Accessed: Apr. 07, 2026. [Online]. Available: https://eric.ed.gov/?id=EJ1079585

21. F. Martin and D. U. Bolliger, 'Engagement Matters: Student Perceptions on the Importance of Engagement Strategies in the Online Learning Environment', Online Learning, vol. 22, no. 1, pp. 205–222, Mar. 2018.

22. S. S. Jaggars and D. Xu, 'How do online course design features influence student performance?', Computers & Education, vol.

95, pp. 270–284, Apr. 2016, doi: 10.1016/j.compedu.2016.01.014.

23. D. R. Garrison and N. D. Vaughan, Blended Learning in Higher Education: Framework, Principles, and Guidelines. John Wiley & Sons, 2008.

24. S. Hrastinski, 'Asynchronous and synchronous e-learning', Educause quarterly, vol. 31, no. 4, pp. 51–55, 2008.

25. A. Raes, L. Detienne, I. Windey, and F. Depaepe, 'A systematic literature review on synchronous hybrid learning: gaps identified', Learning Environ Res, vol. 23, no. 3, pp. 269–290, Oct. 2020, doi: 10.1007/s10984-019-09303-z.

26. R. A. Rasheed, A. Kamsin, and N. A. Abdullah, 'Challenges in the online component of blended learning: A systematic review', Computers & Education, vol. 144, p. 103701, Jan. 2020, doi: 10.1016/j.compedu.2019.103701.

27. E. Hehir, M. Zeller, J. Luckhurst, and T. Chandler, 'Developing student connectedness under remote learning using digital resources: A systematic review', Educ Inf Technol, vol. 26, no. 5, pp. 6531–6548, Sep. 2021, doi: 10.1007/s10639-021-10577-1.

28. H. Fiock, 'Designing a Community of Inquiry in Online Courses', The International Review of Research in Open and Distributed Learning, vol. 21, no. 1, pp. 135–153, Jan. 2020, doi: 10.19173/irrodl.v20i5.3985.

29. P. Redmond, A. Heffernan, L. Abawi, A. Brown, and R. Henderson, 'An Online Engagement Framework for Higher Education', OLJ, vol. 22, no. 1, Mar. 2018, doi: 10.24059/olj.v22i1.1175.

30. E. Alqurashi, 'Predicting student satisfaction and perceived learning within online learning environments', Distance Education, vol. 40, no. 1, pp. 133–148, Jan. 2019, doi: 10.1080/01587919.2018.1553562.

31. Y.-C. Kuo, A. E. Walker, B. R. Belland, and K. E. E. Schroder, 'A Predictive Study of Student Satisfaction in Online Education Programs', irrodl, vol. 14, no. 1, pp. 16–39, 2013, doi: 10.19173/irrodl.v14i1.1338.

32. F. Ouyang and Y.-H. Chang, 'The relationships between social participatory roles and cognitive engagement levels in online discussions', British Journal of Educational Technology, vol. 50, no. 3, pp. 1396–1414, 2019, doi: 10.1111/bjet.12647.

33. J. Borup, R. E. West, and C. R. Graham, 'The influence of asynchronous video communication on learner social presence: a narrative analysis of four cases', Distance Education, vol. 34, no. 1, pp. 48–63, May 2013, doi: 10.1080/01587919.2013.770427.

34. T. M. Wut, P. M. Ng, and M. P. Low, 'Engaging university students in online learning: a regional comparative study from the perspective of social presence theory', J. Comput. Educ., vol. 11, no. 3, pp. 763–789, Sep. 2024, doi: 10.1007/s40692-023-00278-8.

35. A. Bach and F. Thiel, 'Collaborative online learning in higher education—quality of digital interaction and associations with individual and group-related factors', Front. Educ., vol. 9, Nov. 2024, doi: 10.3389/feduc.2024.1356271.

36. A. Patricia Aguilera-Hermida, 'College students' use and acceptance of emergency online learning due to COVID-19', International Journal of Educational Research Open, vol. 1, p. 100011, Jan. 2020, doi: 10.1016/j.ijedro.2020.100011.

37. O. B. Adedoyin and E. Soykan, 'Covid-19 pandemic and online learning: the challenges and opportunities', Interactive Learning Environments, vol. 31, no. 2, pp. 863–875, Feb. 2023, doi: 10.1080/10494820.2020.1813180.

38. M. Sutcliffe and K. Noble, 'Belonging, trust and social isolation: the move on-line during the time of COVID – A longitudinal study', Heliyon, vol. 8, no. 9, Sep. 2022, doi: 10.1016/j.heliyon.2022.e10637.

39. A. Aristovnik, D. Keržič, D. Ravšelj, N. Tomaževič, and L. Umek, 'Impacts of the COVID-19 Pandemic on Life of Higher Education Students: A Global Perspective', Sustainability, vol. 12, no. 20, p. 8438, Jan. 2020, doi: 10.3390/su12208438.

40. J. S. Barrot, I. I. Llenares, and L. S. del Rosario, 'Students' online learning challenges during the pandemic and how they cope with them: The case of the Philippines', Educ Inf Technol, vol. 26, no. 6, pp. 7321–7338, Nov. 2021, doi: 10.1007/s10639-021-10589-x.

41. D. Qualter, 'From Digital Exclusion to Digital Inclusion: Shaping the Role of Parental Involvement in Home-Based Digital Learning – A Narrative Literature Review', Computers in the Schools, vol. 41, no. 2, pp. 120–144, Apr. 2024, doi: 10.1080/07380569.2024.2322167.

42. A. Besser, G. L. Flett, and V. Zeigler-Hill, 'Adaptability to a sudden transition to online learning during the COVID-19 pandemic: Understanding the challenges for students', Scholarship of Teaching and Learning in Psychology, vol. 8, no. 2, pp. 85–105, 2022, doi: 10.1037/stl0000198.

43. N. Shehzad and T. Charles, 'Exploring the impact of instructor social presence on student engagement in online higher education', CONT ED TECHNOLOGY, vol. 15, no. 4, p. ep484, Oct. 2023, doi: 10.30935/cedtech/13823.

44. M. Y. Doo, C. J. Bonk, and H. Heo, 'Examinations of the relationships between self-efficacy, self-regulation, teaching, cognitive presences, and learning engagement during COVID-19', Education Tech Research Dev, vol. 71, no. 2, pp. 481–504, Apr. 2023, doi: 10.1007/s11423-023-10187-3.

45. Y.-C. Kuo, A. E. Walker, K. E. E. Schroder, and B. R. Belland, 'Interaction, Internet self-efficacy, and self-regulated learning as predictors of student satisfaction in online education courses', The Internet and Higher Education, vol. 20, pp. 35–50, Jan. 2014, doi: 10.1016/j.iheduc.2013.10.001.

46. J. Broadbent, 'Comparing online and blended learner's self-regulated learning strategies and academic performance', The Internet and Higher Education, vol. 33, pp. 24–32, Apr. 2017, doi: 10.1016/j.iheduc.2017.01.004.

47. L. Castañeda and N. Selwyn, 'More than tools? Making sense of the ongoing digitizations of higher education', Int J Educ Technol High Educ, vol. 15, no. 1, p. 22, May 2018, doi: 10.1186/s41239-018-0109-y.

48. N. Selwyn, Is Technology Good for Education? John Wiley & Sons, 2016.

49. A. Bozkurt et al., 'A global outlook to the interruption of education due to COVID-19 pandemic: Navigating in a time of uncertainty and crisis', Asian Journal of Distance Education, vol. 15, no. 1, pp. 1–126, Jun. 2020.

50. B. Williamson, R. Eynon, and J. Potter, 'Pandemic politics, pedagogies and practices: digital technologies and distance education during the coronavirus emergency', Learning, Media and Technology, vol. 45, no. 2, pp. 107–114, Apr. 2020, doi: 10.1080/17439884.2020.1761641.

51. M. Bond, S. Bedenlier, V. I. Marín, and M. Händel, 'Emergency remote teaching in higher education: mapping the first global online semester', Int J Educ Technol High Educ, vol. 18, no. 1, p. 50, Aug. 2021, doi: 10.1186/s41239-021-00282-x.

52. T. Fawns, 'An Entangled Pedagogy: Looking Beyond the Pedagogy—Technology Dichotomy', Postdigit Sci Educ, vol. 4, no. 3, pp. 711–728, Oct. 2022, doi: 10.1007/s42438-022-00302-7.

53. K. Kreijns, J. Yau, J. Weidlich, and A. Weinberger, 'Towards a comprehensive framework of social presence for online, hybrid, and blended learning', Front. Educ., vol. 8, Jan. 2024, doi: 10.3389/feduc.2023.1286594.