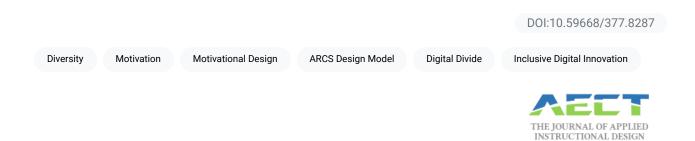# Motivational Design for Inclusive Digital Learning Innovation: A Systematic Literature Review

Jung Sun Sung & Wenhao David Huang

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INSTRUCTIONAL DESIGN

The recent shift of learning to technology-enriched, and -enabled learning environments (TEELE) has exposed unequal access to education. Digital learning innovation derived from such a shift is predictively neglecting learners' diverse motivational needs in online learning. As the first step to design an inclusive digital learning innovation, this systematic literature review is focused on motivational design inquiries published between 2010 – 2021. The review discovered a lack of studies in addressing diverse learners' motivational needs. The findings also suggested applying systematic motivational design through various methodological approaches to understand the role of motivational design in supporting inclusive digital learning environments.

Introduction

As a result of COVID-19, recent education and learning and development operations have shifted the delivery of learning and teaching activities to online environments due to limited face-to-face interactions in physical workplaces and school settings (Means & Neisler, 2020). As an unintended consequence, critical limitations in online learning environments are highlighted owing to the increasing deployment of online learning and technology-enriched and -enabled learning environments (TEELE) (Huang, 2021; 2022) across various learning and development contexts. For instance, disparities among students' access to computers and the internet continue to remain a significant barrier (Bacher-Hicks et al., 2021; McGuire et al., 2021). In addition to the access barrier, the most challenging aspects of employing online learning include: (1) maintaining students' motivation with this learning format (Zaccoletti et al., 2020) and (2) dealing with the diverse demographics of online learners (Conto et al., 2020). These challenges highlight the importance of applying motivational design strategies for online learning environments by understanding the roots of learners' motivation. Online learning has played a vital role in the dissemination of education during the pandemic. To sustain the innovative features of online learning systems, diverse learners' motivational needs should be considered.

The Role of Motivational Design in Instructional System Design

This rapid shift in the delivery mode of instruction from face-to-face to online may have led learners across contexts to experience considerable challenges in maintaining their motivation with online learning (Huang, 2013; Park & Choi, 2009; Zaccoletti et al., 2020). This present study, grounded in prior inquiries (e.g., Hartnett, 2016; Huang, 2013; Keller, 2010; Ryan & Deci, 2000), considers online learning motivation an ongoing social process that dictates learners' decisions to interact with intended online learning processes. Further, online learning motivation is largely localized to individual learners' early responses to intended learning processes, and it contributes to "learning engagement" that aims at sustaining meaningful and long-term online learning processes. The Engagement Theory (Kearsley & Shneiderman, 1998) emphasizes that engagement is different from interaction in the context of online learning, which may consist of learners' cognitive processes as well as perceived motivational support. Therefore, focusing only on cognitive and behavioral interactions in online learning environments is insufficient to fully motivate learners (Huang, 2013). In addition, learners in online learning contexts are more likely to have control over what to learn, when to learn, and how to learn. Learners have the flexibility to learn anytime and at different locations (Dhawan, 2020). Even if flexibility is one of the strengths of online learning, the metacognitive and meta-social control a learner has to implement for online coursework depends on learners' motivational status (i.e., volitional control) (Keller, 2008). Providing learners with motivating online learning processes via systematic design approaches, however, has often been overlooked in mainstream instructional system design processes and models. Although research has argued that systematic approaches to address learners' motivational needs (motivational design) is critical to ensure effective online learning (Huang, 2013, 2018; Keller, 2018).

The definition of 'motivational design' adopted in this study stems from John Keller's scholarship with decades of conceptual and empirical findings (Keller, 1987, 1988, 2008, 2010). In terms of design process, motivational design refers to "the process of arranging resources and procedures to bring about changes in people's motivation" (Keller, 2010, p. 22). Motivational design in this study is focused on the design and development of motivational support in learning environments. It involves systematic processes and motivational strategies that help learners sustain their behaviors of achieving learning goals. The systematic motivational design process includes ten steps: (1) obtain course information, (2) obtain audience information, (3) analyze audience, (4) analyze existing materials, (5) list objectives and assessments, (6) list potential tactics, (7) select and design tactics, (8) integrate with instruction, (9) select and develop materials, and (10) evaluate and revise (Keller, 2010, p.57).

Diversified Online Learner Populations

Online learner populations are becoming significantly diverse due to the ongoing systematic interruption (i.e., COVID 19) as it necessitates the expansion of online learning across various learning and development contexts. Such diversity among learners not only is manifested by their access to and prior learning experiences in online learning environments, but also it is grounded in learners' racial, social, and cultural backgrounds. All the demographic, educational, and social backgrounds among online learners are the foundation to form their unique motivational needs and therefore, influence engagement with online learning. As an example, studies have shown that ethnically underrepresented students in STEM fields tend to struggle with having motivation for online courses (Asgari et al., 2021; Cromley & Kunze, 2021; Walsh et al., 2021). In contrast, an alternative study (Amina, 2021) reports that women's capabilities are increased through expanded access to online learning by having more opportunities to be involved in their STEM-related jobs during the pandemic. These studies show that learners' social and cultural background impact their learning motivation when they learn through online learning.

Conto and colleagues (2020) reported that in recent school shutdowns around the world due to limiting face-to-face interactions, lower-income nations show the least utilization of online platforms and take-home materials (64%) and are alternatively relying on television (92%) and radio (93%). In comparison, higher-income nations show the most utilization for online platforms (95%) while relying the least on television (63%) and radio (22%).

Prior to the school closures, online learning was generally more adopted for training returning adults and transfer students where online learning programs were focused on primarily adults returning to school from an absence. For K-

12 students, very few teachers and students had extensive experience with online learning before the mandatory school closures by the pandemic (Barbour & LaBonte, 2017; Barbour & Reeves, 2009).

As of late March 2020, UNESCO projected that more than 190 countries in the world closed schools. As a result, this pandemic context affected 1.6 billion students' learning experiences (Conto et al., 2020). While the emerging challenges brought by the pandemic could be less relevant years from now, they have offered impetus to respond now to the changing demographics of online learners and the accompanied diverse learners' needs for long-term success in online learning or digital learning environments.

In the context of this present study, the diversity of learners, manifested by their motivational needs, highlights a focus on physical access to online learning environments or digital learning innovations, but learners' motivational needs for achieving intended online learning processes and outcomes must be addressed. In particular, designing motivational support in online learning environments should be the priority. Our rationale is threefold. First, motivational support is the foundation of learning engagement (Huang, 2013; Kearsley & Shneiderman, 1998). "Learning motivation" that is largely localized to individual learners' early responses to intended learning processes can lead to long-term "learning engagement" in online learning environments. Second, motivational support has been largely overlooked by prominent instructional design processes and models. As learner motivation drives learners' early cognitive, affective, and behavioral efforts during online learning processes, instructional design effort should purposefully be a part of learners' motivational analysis and motivational design. Third, as online learner populations are increasingly diverse in their racial, social, cultural, linguistic, and educational backgrounds, the design of motivational support for learning should no longer be based on outdated assumptions (e.g., all learners have equitable access to internet connections, learners' skill levels in using online content are the same) (Ragnedda, 2019). A dedicated motivational design analysis is needed to reveal the fundamental causes of learners' motivational barriers created by learners' social and cultural backgrounds. Grounded in the aforementioned reasons, we are advocating for inclusive digital learning innovation that is focused on addressing learners' diverse motivational needs with systematic motivational design processes.

Purpose of the Study

Current societal and social phenomena show the importance of motivational design for diverse learners as the first step towards inclusive digital learning innovation in the context of online learning. This systematic literature review study surveys the landscape of motivational design research between 2010 and 2021 to understand the recent trends of how motivational design has been investigated and what types of learners have been included in online and digital learning environments. The definition of 'motivational design' helps this study focus on the systematic motivational strategies and methods to enable changes in people's motivation rather than the broadly defined instructional design strategies.

Research Questions

This review aims to answer the following questions:

1. What are the roles of motivational design in online and digital learning environments?
2. What are the demographic and contextual criteria considered for motivational design in online and digital learning environments?

Method

This research was carried out by following the systematic literature review key steps laid out by Pati and Lorusso (2018).

Selection criteria

The following criteria were applied to identify the literature to be reviewed:

1. The literature was selected if it was published in peer-reviewed journal articles and proceedings in the English language. This provides easy access to the majority of scientific publication readers around the world as most scientific publications are in English (Gordin, 2015; Montgomery, 2013; Ramírez-Castañeda, 2020).
2. The literature was included if the studies provided empirical data and interpretation of data analysis. Literature reviews, proposals, and conceptual papers were excluded.
3. The literature was included if studies were conducted for online courses, blended courses, and digital learning applications.
4. The literature was included if the studies were conducted in teaching and learning environments. Studies for patients, the general public, and employees without teaching and learning goals were excluded.

Search and selection process

The literature search and selection process is listed below.

1. SCOPUS was used as the literature database for two reasons. First, Shah and colleagues (2017) reported that on the topic of inclusive education research, SCOPUS could retrieve publications from influential research journals more effectively than automated academic databases (e.g., Google Scholar). Second, the use of SCOPUS allows the study to be differentiated from previous literature review search strategies on motivational design based on a broad range of academic databases (e.g., Li & Keller, 2018).
2. The keywords "motivational design", "motivation" and "instructional design" and "online learning", "motivation" and "instructional design" and "blended learning", and "motivation" and "instructional design" and "digital" were used based on the literature review. These keywords are used to keep the focus of this study on systematic motivational strategies in the instructional design process and methods, specifically in the context of online learning, blended learning, and digital learning environments.
3. The literature was limited to published peer-reviewed journal articles and proceedings between January 2010 and December 2021.

The search process yielded a total of 58 publications. The volume is insignificant in comparison with the volume of peer-reviewed publications with keywords of "learning technology (n=3,814), "educational technology" (n=3,978), or "instructional design" (n=1,358) during the same publication period (2010 - 2021) on SCOPUS. All 58 articles were reviewed by two researchers to enhance validity and reliability. Only 29 articles met the mentioned four selection criteria and were included in the analysis.

Data Analysis

Based on the nature of the research questions and the amount of literature, content analysis (Hsieh & Shannon, 2005) was conducted for this review. The two research questions served as the initial coding categories for the intended content analysis. That is, all 29 articles were reviewed and categorized based on the research questions. In addition, considering the essential role of ARCS motivational design in the field of learning system design (Keller, 2018; Li & Keller, 2018), the literature was divided based on whether or not the study adopted the ARCS model to guide the study. A discussion on the ARCS model will follow. To answer the first research question, all 29 articles were categorized by "research goals" and "roles of motivational design". Second, to answer the second research question, all 29 articles were compared based on the "locations of the research", "learning environment", "target learners", and "studied demographic factors" to reveal demographic and contextual factors applied in reviewed studies. The demographic factors in this study refer to the target audiences' socio-demographic factors (e.g., age, gender, race, education, and prior experience), which were either identified by the study participants or were applied to interpret the findings. Both researchers were able to achieve a high level of inter-rater reliability at 96% (Drost, 2011; Frey, 2018) prior to analyzing all 29 publications.

Findings

Although all 29 publications studied some aspect of "motivational design", 17 studies applied the ARCS model (Keller, 1987) to their inquiries. The ARCS motivational design model was developed for creating effective ways to identify major influences on the motivation to learn, and for adopting systematic methods to diagnose and address learners' motivational needs. This model articulates concepts and variables that characterize learning motivation and implements strategies that enhance the motivational appeal of instruction. The model defines four major motivational conditions (i.e., Attention, Relevance, Confidence, and Satisfaction) that must be met for learners to become and remain motivated. Also, it proposes a systematic motivational design process (i.e., Define, Design, Develop, and Evaluate), which can be used with typical instructional system design and development models (Huang, 2013; Keller, 1987, 2010).

ARCS Model-Grounded Studies

Studies grounded in ARCS model can be categorized by "research goals", "roles of motivational design", "locations of the research", "learning environment", "target learners", and "studied demographic factors". The roles of motivational design are depicted in study findings by explaining the impact of motivational design on various learning outcomes and learners' attitudes. 11 studies applied the ARCS model to design and evaluate new instructional tools; another six studies applied the ARCS model only for evaluating existing educational tools with the focus on learner's motivation status; eight studies applied the ARCS model to measure learner's motivation along with learners' learning outcomes, confidence, interests, tendency to use technology, and engagement (see Table 1).

Table 1

Goals of research and roles of motivational design of reviewed ARCS model studies

Goals of Research	Roles of motivational design	Studies
Design and evaluate	Learners' motivation	Colakoglu & Akdemir (2010) Hamzah et al. (2015) Durrani & Kamal (2020) Vagianou et al. (2021)
	Learners' motivation with learners' learning outcomes/confidence/interests/ familiarity/tendency to use technology/engagement	Omrani et al. (2012) Hodges & Kim (2013) Sek et al. (2015) Yurdaarmagan et al. (2015) Thompson & Carrier (2016) Stockdale et al. (2019) Iwasaki (2021)
Evaluate the existing educational tools	Learners' motivation	Pittenger & Doering (2010) Huang (2014) Wan & Gregory (2018) Huang (2019) Ma & Lee (2020)
	Learners' motivation with learners' learning outcomes	Lu et al. (2020)

Studies that developed educational tools by applying the ARCS model describe the role of motivational design as it plays an effective part in developing learners' motivation in regard to the new learning environments (e.g., Open Learner Model and blended learning environment) (Durrani & Kamal, 2020; Sek et al., 2015), towards their interests/attitudes toward mathematics with better learning outcomes (Hodges & Kim, 2013), and the audience's inspiration for future technology use (Huang, 2014). In addition, one study showed how the combination of another instructional design model/feature (e.g., ADDIE model and gamification) and motivational design improved learners' motivation and learning process (Vagianou et al., 2021). On the other hand, studies that evaluated existing educational tools based on the ARCS model were focused on the roles of motivational design based on the motivational factors such as 'Attention, Relevance, Confidence, and Satisfaction'. For instance, augmented reality (AR) functionality in physical puzzle-type games did support a comparatively lower confidence level among K-12 students (Lu et al., 2020). The learners' motivation progress was mostly measured by using the validated Instructional Materials Motivation Survey (IMMS) (Keller, 1987) or the Course Interest Survey (CIS) (Keller & Subhiyah, 1993). Learning outcomes, learners' interests, and tendency to use technology were measured by learners' post-course test scores and other instruments, such as the Fennema-Sherman Mathematics Attitudes (FSAMA) (Fennema & Sherman, 1976). The analysis implies that the motivational design strategies are applied to improve not only learners' motivation but also learners' confidence and familiarity with using technology.

The geographical locations of the 17 studies using the ARCS model include Australia, Byzantine, China, Iran, Malaysia, Taiwan, Turkey, and the U.S. There are ten studies conducted outside of the U.S., while seven studies were conducted in the U.S. (see Table 2).

Table 2

Locations of the Reviewed ARCS Model Studies

Locations	Studies
Australia	Wan & Gregory (2018)
Byzantine	Vagianou et al. (2021)
China	Ma & Lee (2020)
Iran	Omrani et al. (2012)
Malaysia	Hamzah et al. (2015), Sek et al. (2015)
Taiwan	Lu et al. (2020)
Turkey	Colakoglu & Akdemir (2010), Yurdaarmagan et al. (2015)
UAE	Durrani & Kamal (2020)
US	Pittenger & Doering (2010), Hodges & Kim (2013) Huang (2014), Thompson & Carrier (2016) Huang (2019), Stockdale et al. (2019), Iwasaki (2021)

The studied learning environment grounded in the ARCS model consisted of blended learning, digital application/web 2.0 (social media), e-learning/online learning, Massive Open Online Course (MOOCs), and virtual reality (see Table 3). Digital applications include music instrument practice and augmented reality function puzzle games to motivate learners. While the online and e-learning environments were studied the most, the ARCS model was applied to diverse learning environments.

Table 3

Learning Environment of reviewed ARCS Model Studies

Learning Environment	Studies
Blended learning	Colakoglu & Akdemir (2010), Durrani & Kamal (2020)
Digital application/Web 2.0	Huang (2014), Yurdaarmagan et al. (2015), Wan & Gregory (2018), Lu et al. (2020)
E- learning/Online learning	Omrani et al. (2012), Hodges & Kim (2013), Hamzah et al. (2015), Thompson & Carrier (2016), Stockdale et al. (2019), Iwasaki (2021), Vagianou et al. (2021)
MOOCs/Open learning	Pittenger & Doering (2010), Sek et al. (2015), Ma & Lee (2020)
Virtual Reality	Huang (2019)

In terms of target audience, only four out of 17 studies based on the ARCS model targeted the K-12 learning setting, while 13 studies were situated in higher education (see Table 4). For studies in K-12, learners' age was mainly considered as a demographic factor. One of the studies developed a new motivational design framework and this framework was evaluated not by students but K-12 teachers (Vagianou et al., 2021). In this study, teachers' field of study, working experience, and gender were considered during the data collection process. Studies in the higher education setting addressed many socio-demographic factors of learners including academic level, age, gender, marital status, learning preference, and prior experience with technology (or online learning). One study mentioned the efforts of including diverse students' groups and indicated that there were no participants from the special needs group (Durrani & Kamal, 2020). Participants demographic factors were described in the methodology section but none of these studies showed how the findings were related to the participants' socio-demographic factors. For example, how learners' motivation and learning outcomes were different based on their demographic factors was not addressed.

Table 4

Target learners and studied demographic factors of reviewed ARCS Model Studies

Target learners	Studied demographic factors	Studies
K-12	Age/gender	Yurdaarmagan et al. (2015)
	Field of study/gender/working experience	Vagianou et al. (2021)
	Age	Wan & Gregory (2018)
	Age	Lu et al. (2020)
Higher education	Academic level	Colakoglu & Akdemir (2010)
	Academic level/Age/gender	Pittenger & Doering (2010)
	Ability to use computer/age/gender/marital status	Omrani et al. (2012)
	Age/gender/race/academic level/prior experience	Hodges & Kim (2013)
	Academic level/gender/major	Huang (2014)
	Academic level	Hamzah et al. (2015)
	Gender/learners' preference/major	Sek et al. (2015),
	Academic level	Thompson & Carrier (2016)
	Academic level/gender/prior experience	Huang (2019)
	Age/gender/prior experience	Stockdale et al. (2019)
	Academic level/age/gender/special needs	Durrani & Kamal (2020)
	Academic level	Ma & Lee (2020)
	Academic level/major	Iwasaki (2021)

Other Motivational Design Studies

There were 12 reviewed studies that did not use the ARCS model for the motivational design inquiries. Among these 12 studies, four studies either did not measure learners' motivation or did not directly discuss learners' motivation in their findings (Casimiro, 2011; Joo et al., 2015; Ng & Przybyłek, 2021; Rosenberger, 2019). These studies were excluded from Tables 5, 6, and 7. One study applied modality and radiance design principle (Mayer, 2014) to design and evaluate adult learners' situational interest in the online learning environment (Dousay, 2016). Motivational design in this study was implemented by avoiding needless multimedia methods to teach learners so that learners can sustain their interests for better learning outcomes. Another study applied the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003) to investigate how learners might be motivated to engage with the Open Learning Environment System (Huang, 2017) (see Table 5 and 6). The main role of the motivational design in this study was to examine the Open Learning System to address learners' motivational challenges relevant to learning goals and self-efficiency. Also, there was one study which measured how the motivational design influenced learners' attitude toward the blended learning format and the results showed that students highly rated this format since it helped the learners to stay on track (Gawlik-Kobylińska et al., 2021). In this study, participants were asked about their prior experience with the learning format. Similar to the aforementioned studies with the ARCS model, none of these studies connected participants' socio-demographic factors to study findings (see Table 7).

However, there is one study connecting learners' gamification user types to online learning activities to understand how learners are motivated differently based on their types (Bovermann & Bastiaens, 2020). This study suggests that it is important to understand target learner groups with their own leaning types and use a systematic approach to conduct meaningful online learning design.

Table 5

Goals of research and roles of motivational design studies without ARCS model (n=4)

Goals of research	Roles of motivational design	Studies
Design and evaluate	Learners' emotion/engagement	Dias et al. (2010)
	Learning outcomes/learners' interests	Dousay (2016)
	Learning outcomes/learners'	Hui et al. (2018)
	Learning outcomes/learners' motivation/learners' attitude to learning format	Gawlik-Kobylińska et al. (2021)
Evaluate	Learners' motivation	Author (2017)
	Connection between gamification user types and online learning activities	Bovermann & Bastiaens (2020)
	Learners' motivation/mental effort/learning outcome/cognitive load	Hawlitschek & Joeckel (2017)
	Learners' learning performance/learners' mental effort (motivation) /learners' involvement	Königschulte (2015)

Table 6

Learning environment of reviewed studies without ARCS model (n=4)

Learning environment	Studies
Blended learning	Hui et al. (2018), Gawlik-Kobylińska et al. (2021)
Digital application	Königschulte (2015), Hawlitschek & Joeckel (2017)
E-learning/online learning	Dias et al. (2010), Dousay, (2016) Bovermann & Bastiaens (2020)
Open learning	Huang (2017)

Table 7

Target audience, demographic factors, and locations of reviewed studies without ARCS model

Target learners	Demographic factors	Studies	Locations
Higher education	Academic level/age	Königschulte (2015)	Germany
	Academic level	Hui et al. (2018)	Hong Kong
	Academic level/prior experience	Gawlik-Kobylińska et al. (2021)	Poland
	Academic level/age/gamification user type/gender/major	Bovermann & Bastiaens (2020)	Germany
Adult learner	Academic level/age/gender Academic level/age/gender /job types	Dousay, (2016) Huang (2017)	U.S. Taiwan
K-12	Age/gender	Hawlitschek & Joeckel (2017)	Germany
No specified learners	None	Dias et al. (2010)	Brazil

Discussion

The findings highlight several emerging needs in order to address motivational needs of diverse online learner populations. First, this review study suggests the need for applying systematic design processes to improve motivational support as merely half of the reviewed studies (11 out of 25) applied a systematic process (i.e., ARCS model) to design and evaluate corresponding motivational support. Many studies have not applied systematic design methods or have not appropriately measured learners' motivation progress. Even for studies applying the ARCS model to design new learning tools, the effectiveness of the motivational strategies was assessed by learners' assessment scores or other non-motivational achievements. According to Keller (1987), it is an important fact to base evaluation of the instructional materials primarily on motivational and learning outcomes since learning achievements (e.g., scores) could be affected by many other circumstances. Learners' persistence, intensity of effort, emotion, and attitude should be considered to understand the effectiveness of motivational strategies to address learners' diverse motivational needs.

Second, K-12 learners and teachers, by comparison with other learning and development contexts (e.g., higher education, workplaces), have not been exposed to the online learning environment extensively. Consequently, there is a lack of motivational design studies that are focused on K-12 learners' online learning environment for formal learning purposes. Motivational design studies that targeted K-12 learners are also limited to the shorter-term use of digital applications as part of some learning activities. A comprehensive and longitudinal approach to diagnose and address young learners' and their teachers' motivational needs in online learning environments is in dire need.

Third, the findings show the diversity of learning environments (blended learning, e-learning, mobile applications, and virtual reality) and many geographic locations (Australia, China, Malaysia, and U.S.) of the reviewed motivational design studies. However, there is a noticeable absence of studies investigating influences of social experiences, cultural affiliation, economic status, and prior educational struggles of learners in a time when online learning is becoming increasingly diverse. In other words, learners' diverse backgrounds and thus their impact on learners' motivational needs have been excluded from the majority of reviewed motivational design studies. As online learners' motivational needs are the product of constant social interactions with systemic barriers (access barriers), considering online learners' vibrant and diverse experiences based on sex, age, race, ethnicity, socio-economic status, languages, and culture is essential to fully understand the root causes of their motivational problems. By extension, diversity-driven motivational design approaches could help us address the impact of digital divides derived from current and future digital learning innovations.

Fourth, for a deeper understanding of diverse learners' motivational needs, an expanded inquiry of motivational support using various methodological approaches is needed. In addition to cross-sectional studies, longitudinal research design should be adopted more frequently to contribute to the field of motivational design with time-based evidence to document online learners' fluctuating motivational needs during learning processes.

Finally, this study recognizes the limitation of sourcing the reviewed studies from one scientific and academic database. Our goal is to provide a focused and differentiated perspective derived from impactful peer-reviewed research publications.

Conclusion

To address the need of applying motivational design as the first step towards an inclusive digital learning innovation, the keywords of "motivational design", "motivation" and "instructional design" and "online learning", "motivation" and "instructional design" and "blended learning", and "motivation" and "instructional design" and "digital" were used to retrieve 29 peer-reviewed journal articles published in English from 2010 to 2021. These papers were reviewed based on research goals, research locations, learning environments, and targeted audience. The findings suggest:

1. Applying a systematic design process to improve motivational support is needed
2. There is a lack of motivational studies for K-12 online learners
3. There is a lack of effort to study the impacts of the learners' diverse backgrounds on their motivational needs in the context online learning
4. Various methodological approaches for a deeper understanding of diverse learners' motivational needs are required.

A collaborative approach of these efforts would enhance our understanding on how to make the motivational design process more systematic and inclusive.

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Jung Sun Sung

University of Illinois at Urbana-Champaign

Jung Sun Sung is a Ph.D. student and a program evaluator. Her evaluation projects and research are focused on program effectiveness, implementation, impact, sustainability, and diversity by developing contextualized instructional methods for diverse learners, particularly for STEM education in higher education settings.

Wenhao David Huang

University of Illinois at Urbana-Champaign

Wenhao David Huang is a Professor of Human Resource Development. His research improves the design, implementation, and evaluation of interventions to optimize the motivation and capabilities of individuals and organizations to change. His current research includes motivational scaffold in immersive VR learning and technologies' motivational and cognitive effects on learning.

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