

Learning Management Systems and e-Heutagogy: A Review of Their Impact on Self-Directed Learning in U.S. Classrooms

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Abstract: The fast drive to digital in American classrooms has led to the widespread adoption of Learning Management Systems (LMS) in K–12 and higher education. This review focuses on the connection between LMS platforms and e-heutagogy, which is a learner-centered, technology-enhanced strategy that emphasizes independence, skill development, and self-directed learning (SDL). The review illustrates how major LMS elements, including adaptive learning modules, self-assessment tools, and collaborative spaces, boost SDL outcomes, based on more than ten years of real-world and theoretical research. It highlights various issues and opportunities at different levels of education, such as inadequate infrastructure, concerns about justice, and inadequate preparation for development, as important impediments in K–12 education, compared to greater e-heutagogical alignment in higher education. From our analysis, we find that institutional variables like leadership, professional development, and digital infrastructure are vital for making things happen. However, concerns including digital literacy gaps, unequal access, and limited teacher support continue to remain problems. The review makes it obvious that inclusive LMS design concepts, such as Universal Design for Learning, mobile-first functionality, low-bandwidth accessibility, and multilingual support, are important to establish fair digital learning environments. In the end, it asks for continued teacher training and comprehensive institutional initiatives to make the most of LMS, which will help SDL and educational equity in a wide spectrum of U.S. classrooms.

Keywords: Digital Pedagogy, e-Heutagogy, Learning Management Systems, K–12 Education, Higher Education, Self-Directed Learning, and Educational Equity.

INTRODUCTION

The digital transformation of U.S. schools has accelerated the usage of Learning Management Systems (LMS) in both K–12 and higher education (Means & Neisler, 2021, Nabi et al, 2025). LMS systems are the key instruments for online and hybrid learning. They aid with course delivery, communication, assessments, and analytics (Dahlstrom, Brooks, & Bichsel, 2014). As of 2021, practically all colleges and universities and a huge majority of K–12 districts employ an LMS to keep lessons flowing, especially during times of disruption like the COVID-19 pandemic (Dimeo, 2017; Trust & Whalen, 2020). LMSs are scalable and flexible, which has allowed schools to provide more courses to a wider spectrum of students, including those who live far away (Ifenthaler & Yau, 2020; De Oliveira, de Oliveira, & Cossi, 2021).

The COVID-19 pandemic accelerated up the adoption rate to this level, which has transformed the way American classrooms teach (Johnson *et al.*, 2022). As teachers and students use digital platforms more and more, e-heutagogy, or self-directed learning made easier by technology, has become a popular technique to assist students in understanding how to learn on their own (Blaschke, 2012). This review focuses on the overlap between LMS adoption and e-heutagogical

practices and how they affect student autonomy and self-directed learning in U.S. institutions.

The rise of self-directed learning (SDL) and learner autonomy in modern education has gone hand in hand with the development of learning management systems (LMS). As LMS platforms have grown from simple content storage systems to complex, interactive spaces, they now incorporate features like adaptive learning paths, real-time feedback, and personalized resources. These features provide students with more choice over their learning journeys (Blaschke & Hase, 2019). As technology develops swiftly and people's expectations change, SDL is in more demand. For example, workers now prioritize abilities like critical thinking, self-motivation, and lifelong learning (Blaschke, 2012). The current LMS versions foster independent learning practices by allowing students to access materials in a flexible way, work with their peers, and assess their work. This makes it vital for training students equipped to succeed in contexts that are becoming more complicated and dynamic (Johnson *et al.*, 2022). In this regard, the development of LMS technology is not only a response to the greater trend in education toward providing students more flexibility and control over their own learning, but it is also a driving force behind it.

The purpose of this review is to carefully look at how integrating LMS and e-heutagogical techniques affects students' ability to learn on their own and be independent in U.S. classrooms.

Conceptual framework

This idea is put into practice on LMS platforms through activities like discussion forums, group projects, and interactive simulations. These activities help students learn by allowing them interact with their peers and the content in relevant ways (Blaschke, 2012). Connectivism, on the other hand, is a new paradigm that has come up due of the digital age. It underlines the necessity of networks and being able to access and combine multiple sources of information (Siemens, 2005). LMS platforms support connectivism learning by making it simpler for learners, teachers, and resources to connect with each other through built-in capabilities like wikis, social media linkages, and real-time communication features. These platforms put both theories into effect by creating dynamic venues where knowledge is created both individually and cooperatively and shared across digital networks. This facilitates deeper engagement and self-directed learning (Blaschke & Hase, 2019).

Learning Management Systems: Digital platforms for managing, delivering, and tracking educational content and activities (Dahlstrom *et al.*, 2014).

e-Heutagogy: e-Heutagogy is the use of heutagogical ideas in electronic or digital learning settings. Heutagogical ideas are based on self-determined learning. In e-heutagogy, students use computers and the internet to plan and manage their learning. This is all about being independent, having skills, and being able to change (Blaschke, 2012).

Self-Directed Learning (SDL) is a process in which learners take the lead, with or without help from others, to figure out what they need to learn, set goals, find resources, and assess their learning outcomes (Eberle & Childress, 2022).

METHODOLOGY

Search Strategy

We used databases like Scopus and Google Scholar to do a systematic review of the literature. "Learning management systems", "e-heutagogy", "self-directed learning", and "U.S." were some of the words that were used to search. Only peer-reviewed empirical and theoretical studies that looked at the U.S. context were considered.

Thematic analysis was used to find important connections between LMS features, e-heutagogical practices, and SDL outcomes.

RESULTS AND FINDINGS

LMS Features Enabling SDL

The heutagogy approach supports improved self-directed learning (SDL) among adult learners by promoting autonomy, reflection, and the integration of theory with practice. Research reveals that heutagogy enables learners to become more self-determined and autonomous, enabling them to establish difficult goals and build abilities impacting their self-determination. Adult learners acquire confidence through reflective practices and independently explore new difficulties without waiting for instructor's direction. This learner-centred approach also facilitates peer learning and collaborative knowledge sharing, boosting competences in the 21st-century educational environment (Gillaspy & Vasilica, 2021)

Several LMS elements have been found to help students learn on their own (SDL) at all levels of education. Students can control their own learning paths using adaptive learning modules, self-paced material delivery, and access to a wide range of digital resources (Blaschke & Hase, 2019; Rasheed *et al.*, 2020). Discussion forums, peer collaboration spaces, and instant messaging are all examples of communication technologies that let people share information and reflect on their work, which are both crucial pieces of SDL (Khalil & Ebner, 2017). In higher education, features like learning analytics, configurable learning paths, and built-in assessment tools enable students to set goals, keep track of their progress, and undertake self-assessments (Johnson *et al.*, 2022). Meta-analyses demonstrate that students who actively employ these qualities become considerably more independent, driven, and metacognitive (Rasheed *et al.*, 2020).

Al-Fraihat *et al.* (2020) also present a thorough methodology for measuring how well e-learning systems operate. They point out critical criteria, including the quality of the system, the quality of the information, and the quality of the service. These things have a direct effect on how useful and satisfying consumers think something is, which are two crucial factors for motivating people to remain using something and learn on their own. Their study demonstrates that when learning management systems (LMS) are developed with high usability, reliable material delivery, and responsive assistance in mind, students are more

likely to take responsibility of their education and continue with it.

Barriers to Implementation

Environmental Factors

Environmental constraints play a pivotal role in hindering the implementation of heutagogical principles in education systems. Ramas et al. (2023) highlight several technological challenges such as limited ICT infrastructure, poor internet connectivity, and insufficient technical support, that obstruct non-linear learning pathways central to the heutagogy approach. These limitations are particularly pronounced in rural and under-resourced regions, where equitable access to digital tools remains a persistent issue.

Another critical barrier involves facilitators' limited understanding of self-directed learning (SDL) and the heutagogical framework. Misinterpretations of SDL principles often result in ineffective instructional strategies. Ramas et al. (2023) emphasize the importance of equipping facilitators with appropriate resources and training modules that align with their cognitive and emotional needs. Without such support, facilitators struggle to deliver quality instruction, and learners

face challenges in engaging with SDL methodologies.

Moreover, the lack of tailored resources and digital equipment negatively affects both educators and learners. Inadequate access to smartphones, gamified learning tools, and other technological aids diminish learner engagement and autonomy. Ramas et al. (2023) argue that integrating such tools can significantly enhance motivation and enable learners to independently select pathways that align with their academic goals thus reinforcing the core tenets of heutagogy.

Influencing Institutional Factors

Colleges and institutions with robust digital infrastructure and a culture of innovation are better at adopting LMS to assist SDL (Khalil & Ebner, 2017). To get over implementation challenges in K–12 schools, administrators need to back technology projects, ensure sure everyone has equal access, and offer instructional coaching (Trust & Whalen, 2020). Comparative studies reveal that institutions that are devoted to continuous development and being flexible are more likely to implement LMS-e-heutagogy integration and receive better results at all levels of education (Ng, 2021).

Table 1. LMS Features Aligned with Self-Directed Learning (SDL)

LMS Feature	Alignment with SDL	Example Contexts	
Adaptive learning modules	Personalized learning paths	Higher education, K–12	Blaschke & Hase, 2019
Self-paced content delivery	Learner autonomy, time management	Higher education, K–12	Rasheed <i>et al.</i> , 2020
Discussion forums	Peer collaboration, reflective dialogue	Higher education, K–12	Khalil & Ebner, 2017
Learning analytics	Goal setting, progress monitoring	Higher education	Johnson <i>et al.</i> , 2022
Resource repositories	Flexible access to materials	Higher education, K–12	Rasheed <i>et al.</i> , 2020
Integrated self-assessment tools	Metacognitive skill development	Higher education	Johnson <i>et al.</i> , 2022
System quality and usability	Learner satisfaction, engagement	Higher education, K–12	Al-Fraihat <i>et al.</i> , 2020

Table 2. Barriers to Implementation of LMS for SDL

Barrier	Prevalence	Impacted Levels	Reference(s)
Digital literacy gaps	High	K–12, Higher Education	Trust & Whalen, 2020
Inconsistent technological access	Moderate–High	K–12	Ng, W. (2021).
Need for teacher scaffolding	High	K–12	Ng, W. (2021).
Resistance to pedagogical change	Moderate	Higher Education	Rasheed <i>et al.</i> , 2020

Insufficient professional development	High	K–12, Higher Education	Johnson, N., Veletsianos, G., & Seaman, J. (2022).
Curriculum integration issues	Moderate	K–12, Higher Education	Johnson <i>et al.</i> , 2022

Table 3. Key Institutional Variables Influencing LMS–SDL Outcomes

Institutional Variable	Description	Impact Level	Reference(s)
Leadership support	Commitment to digital learning initiatives	High (all levels)	Johnson <i>et al.</i> , 2022
Professional development	Ongoing training for educators	High (all levels)	Johnson, N., Veletsianos, G., & Seaman, J. (2022).
Digital infrastructure	Reliable access and technical support	High (all levels)	Khalil & Ebner, 2017
Culture of innovation	Willingness to adopt new practices	Higher (Higher Education)	Rasheed <i>et al.</i> , 2020
Equity and access initiatives	Addressing digital divides	High (K–12)	Trust & Whalen, 2020
Instructional coaching	Support for teachers in implementation	High (K–12)	Ng, W. (2021).

KEY FINDINGS

Principles of e-Heutagogy

Studies have identified several environmental challenges that hinder the implementation of non-linear learning, a key principle of the Heutagogy approach. These challenges include technological issues such as limited ICT facilities, insufficient internet access, limited technical support, and the high cognitive and emotional demands of available references. Moreover, a critical factor is the facilitator's understanding of heutagogy and self-directed learning (SDL); misunderstandings between facilitators and learners often lead to implementation problems. Facilitators need thorough knowledge of heutagogical strategies and access to resources or modules that align with their needs to ensure effective execution of this learner-centered approach (Chun & Abdullah, 2021; Gillaspay & Vasilica, 2021).

E-heutagogy, or self-directed learning in digital environments, is based on and builds on adult learning theories like constructivism and andragogy (Blaschke, 2012). It focuses on giving students more freedom, helping them develop their skills, and teaching them how to deal with situations that are uncertain and change quickly. Some of the main ideas behind e-heutagogy are giving learners control, reflection, double-loop learning, and non-linear learning pathways (Blaschke & Hase, 2019). In heutagogical settings, students are given the freedom to set their own goals, pick their own resources, and assess their

own progress skills that are becoming more and more important in today's digital world. Technology is both a tool and an amplifier that lets students see things from different points of view, work together with people all over the world, and create personalized learning experiences (Canning, 2010).

LMS e-Heutagogy Integration

Combining LMS with heutagogical approaches is a huge change in how teachers construct lessons. Modern LMS platforms contain features like adaptive learning paths, open resource sharing, and self-assessment tools that naturally enable learning that is self-directed and self-determined (Blaschke & Hase, 2019). Educators can create an ecosystem where students have power and learn for life by including choice, flexibility, and collaborative places in the digital world. Studies suggest that when LMS technologies are strategically matched with e-heutagogical concepts like learner-driven projects and reflective exercises, students are more engaged, motivated, and able to think critically (Blaschke, 2012; Johnson *et al.*, 2022). So, the combination of LMS features and e-heutagogy is vital for assisting students in U.S. classrooms become more independent and able to learn on their own.

LMS e-Heutagogy Integration: Successes and Limitations Across Educational Levels When LMS and e-heutagogical techniques are utilized simultaneously in K–12 and higher education, the results are varied because of the different demands

of students, the cultures of the institutions, and the phases of development of the students.

In higher education, LMS platforms have generally followed the ideals of e-heutagogy, which encourages learners to be independent, flexible, and ask their own questions (Blaschke, 2012). University students, who are usually older and more focused, can take advantage of LMS features like customised learning paths, asynchronous debates, and a large range of digital materials. When e-heutagogy is employed in LMS driven courses, college students claim they are more engaged, think critically, and feel like they can do things (Blaschke & Hase, 2019). Higher education professors are also more willing to try out learner-driven projects and reflective assignments that make full use of LMS platforms (Johnson *et al.*, 2022).

However applying heutagogical methods successfully in these conditions is more difficult. Older children in secondary schools may be ready to learn on their own, while younger youngsters often need more guidance, structure, and aid from teachers (Trust & Whalen, 2020). Inconsistent digital literacy, different levels of access to technology, and developmental maturity are some of the things that can make LMS-e-heutagogy integration less effective in K–12 schools (Canning, 2010). Also, how ready and supported teachers are is also crucial. K–12 instructors may need specific professional development to assist children grow more independent while nevertheless giving them the suitable quantity of guidance.

Overall, LMS-e-heutagogy integration works better in higher education settings than in K–12 settings, where there are special problems that need careful planning and assistance to attain the same benefits. To get the most out of self-directed learning at all levels of education, more research and personalized implementation plans are needed.

DISCUSSION

Heutagogy is a vital strategy for cultivating 21st-century learning, lifelong learning, and adult education in digital environments. To implement this approach effectively, facilitators must possess a deep understanding of self-determined learning (SDL) and receive targeted professional development from the outset. Ramas *et al.* (2023) emphasize that facilitators' knowledge and pedagogical skills are interdependent; without a

solid grasp of SDL principles, they may struggle to apply heutagogical methods in practice.

Professional development opportunities such as seminars, workshops, and curriculum-aligned training are essential for helping educators integrate SDL into their lesson plans. These initiatives not only build confidence but also equip facilitators to design learning experiences that promote autonomy and adaptability. According to Ramas *et al.* (2023), heutagogical strategies can be applied across disciplines, enabling learners to engage in self-directed learning in diverse contexts and throughout their educational journeys.

Learning Management Systems (LMSs) are highly beneficial for fostering Self-Directed Learning (SDL), which is becoming more and more crucial in today's digital classrooms (Lee *et al.*, 2022). But LMSs need to continuously change in both design and use in order to attain their full potential. Modern LMSs are starting to integrate advanced capabilities like personalized learning pathways, which leverage AI and data analytics to give students customized instructional content and learning paths that adapt based on their needs. This individualised strategy has been demonstrated to boost student engagement and offer them a deeper sense of ownership over their learning (Aljawarneh, 2020).

Also, giving students numerous means to assess themselves, such as e-portfolios, self-assessment tools, and peer review systems, can stimulate reflective learning and help them keep track of their academic progress (Ifinedo, 2018). Adding interactive media, open educational materials, and user-generated content to resource libraries allows learners to explore topics on their own and supports just-in-time learning (Khalil & Ebner, 2020).

It is also crucial to have features that make it easy to create clear goals, see progress in real time, and keep track of milestones. These methods assist students learn how to manage themselves and stay motivated (Panigrahi *et al.*, 2018). Also, LMSs that feature collaborative spaces and online communities allow social learning, peer-to-peer contact, and constructive criticism feasible, all of which are crucial for a robust SDL environment (Rapanta *et al.*, 2020). LMS may do more than just teach people; it can also connect seamlessly to other programs like productivity tools and professional networks. This enables lifelong, holistic learning (Khalil & Ebner, 2020). Lastly,

introducing mobile and microlearning features addresses the growing desire for educational experiences that are flexible and can be done on the go. This way, learners' demands and schedules can be accommodated (Aljawarneh, 2020). Al-Fraihat et al. (2020) believe that system quality, information reliability, and service responsiveness are all crucial for an LMS to be effective, along with its content and features. Learner satisfaction and perceived usefulness, two crucial components promoting sustained engagement and self-directed learning, are highly influenced by these aspects. Their empirical model emphasises again how crucial it is to build LMS systems that are easy to use, dependable, and well-supported so that students may continue forward in their academic careers with confidence.

Additionally vital are tools that facilitate milestone tracking, real-time progress display, and explicit goal-setting. These techniques assist students learn how to control themselves and stay motivated throughout time (Panigrahi *et al.*, 2018). Peer-to-peer interaction, social learning, and constructive criticism are all vital features of a great SDL environment. LMSs can help with these aspects by integrating collaboration areas and online communities (Rapanta *et al.*, 2020).

LIMITATIONS OF THE STUDY

This review has several limitations that should be noted. First, the exclusive focus on U.S.-based studies limits the generalizability of findings to international education systems with different policies, infrastructure, and cultural factors. Second, the rapid pace of digital innovation means some recent LMS capabilities or pedagogical trends may be underrepresented in existing literature. Third, variability in LMS platforms, terminologies, and study methodologies poses challenges for synthesis and comparison across studies. Finally, a relative scarcity of long-term longitudinal research limits understanding of the sustained impacts of LMS-e-heutagogy integration on learner outcomes beyond initial adoption phases.

Equity Challenges for Marginalized Learners

Even with these changes, there are still huge difficulties with fairness. The reliance on digital infrastructure assumes that all students have access to high-speed internet, up-to-date gadgets, and know how to use them, which is not the case for everyone (Crawford *et al.*, 2020). These digital divides have a stronger impact on marginalized populations, like persons from low-income, rural,

or under-resourced communities. This makes existing educational gaps even greater.

Studies demonstrate that kids who have problems accessing digital resources are more likely to lose interest in school, do poorly in school, and feel more pressured (Van Deursen & Van Dijk, 2019). Not being able to fully participate in online learning environments also restricts chances for socializing and seeking aid, which makes many students feel even more alone.

Strategies for Promoting Equity in LMS Implementation

A multi-faceted effort is needed to resolve these discrepancies. When creating an LMS, it should be easy to use on outdated devices and with slow internet connections (Khalil & Ebner, 2020; Aljawarneh, 2020). To ensure that students with disabilities can access the material, it is vital to integrate Universal Design for Learning (UDL) elements, such as support for screen readers, captioned videos, and multiple ways to submit assignments (Trust & Whalen, 2020).

Along with these design aspects, it is vitally important to give all faculty members thorough training. This includes regular workshops for professional development, peer mentorship programs, and the dissemination of practical toolkits to enable teachers to construct online courses that are open to everyone and enjoyable (Rapanta *et al.*, 2020; Crawford *et al.*, 2020).

RECOMMENDATIONS AND CONCLUSION

To make the digital learning environment more welcoming and fairer, it's vital to adopt a multidimensional approach that takes into account both the technological design of LMS platforms and the professional development of faculty members. The key principles indicate that learning management system elements should be intended to fulfil the demands of a wide range of learners, especially those who are experiencing problems with accessibility or infrastructure. At the same time, teachers should be given specific training and support mechanisms that help them accomplish their jobs better.

LMS design should put flexibility and accessibility at the top of the list. This involves making the platform as low-bandwidth as possible by allowing students to interact asynchronously and access course materials offline. This makes it easier for students with unpredictable internet connections to stay involved. Cutting down on data-heavy

information and adopting lightweight file types makes it even easier to access, making ensuring that technology doesn't come in the way of learning (Khalil & Ebner, 2020). A mobile-first approach makes sure that all features and content perform properly and are easy to use on smartphones and tablets. This is significant since many different types of learners use mobile devices.

The implementation of Universal Design for Learning (UDL) principles also makes things more accessible by adding features like screen reader compatibility, captioned videos, and alternative text for images. These adjustments make sure that students who have problems hearing or seeing can get to and use the course materials. Offering a diversity of assignment forms and evaluation alternatives assists students with diverse requirements and ways of learning even more.

To promote fairness, the platform must be carefully developed, and professors must continue to learn. Regular professional development workshops should focus on low-tech teaching methods, course design that incorporates everyone, and how to make the most of asynchronous communication tools. These training sessions help teachers change the way they teach so that it works better for all of their students, especially in places with low resources and a lot of various types of students. Peer mentorship programs can be set up to help people learn new skills and share what they know. For example, experienced faculty members can help their classmates learn the ins and outs of digital pedagogy.

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