

LEARNING MOTIVATION VS. INFORMATION OVERLOAD: THE IMPORTANCE OF STRUCTURE IN DIGITAL LEARNING ENVIRONMENTS

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ABSTRACT

The rising trend of digital technologies extending into the field of education has also given important concerns on the scale between student motivation and information overload. This paper discusses how structure in a digital learning environment is important, paying attention to how properly designed instruction strategies can increase performance by alleviating cognitive load, resulting in more effective learning. The most important theories described in the study include Cognitive Load Theory (CLT) and Self-Determination Theory (SDT), thus create the framework with which the digital environment of learning may be designed to best engage students in better learning activities at the risk of overloading the learner. This paper reviews the literature that exists on these issues and makes the point that instructional design needs to be aligned to the principles of motivation and alleviating unneeded mental challenges. The results indicate the necessity to design courses in a planned manner so as to foster intrinsic motivation, as well as allowing proper technology use.

Keywords: learning motivation, information overload, cognitive load, instructional design, digital learning environments.

INTRODUCTION

Digital learning has also become famous in learning providing opportunities and challenges. The shift towards the technology-enhanced learning (TEL) has introduced one of the primary worries of teachers on how to ensure that students remain dynamic without the negative effects of information overload. Where there is no appropriate way of specifying instructional design, the learners may find themselves baffled in the giant of the material and inability to perform the assignments that they are expected to. However, creating the digital world, clear, directional and truly in line with cognitive skills of students may be the one that will reverse the motivation as well as the learning performance. Among the most crucial peculiarities of digital learning environment, the need to think about the motivation of the learning process, as well as the risk of information overwhelm, should be listed. Interaction is also one of the drivers of motivation and hence when there is poor information delivered as according to the imaginativeness of those who create them and passed to the learners, they would end up thinking too much. These are two important concepts in the theory that one needs to apply so as to design the learning environments that make the process of motivation less risky of the overloading occurrence. Theories such as these are useful in directing the attention being drawn to the necessity of construction of digital activities using reference to cognitive capabilities of learners and internal plans of motivation. The issue of the combination between the motivation to learn and cognitive load in a digital learning setting is what this paper is going to address, a combination, which can be successfully achieved with a proper instructional design. It specifically focuses on how structured learning activities can bring about motivational, reduce cognitive overloads and improve general learning outcomes. Investigating the correspondence between the

motivation of the students and the way instructions are designed, this paper aims at contributing to the setting of successful digital learning environments that would facilitate more situations related to the engagement and success of the students.

LITERATURE REVIEW

Cognitive Load Theory

CLT is a theoretical base which was developed to determine the way the human brain receives and remembers information. Skulmowski and Xu (2022) discussed that CLT implies that students possess a cognitive limitation and that the instructional design should keep the unnecessary cognitive work to the minimum to ensure that a student will not be overloaded. Failure to care about such cognitive load may result in cognitive overload of learners, which will adversely influence their potential outcomes in terms of understanding and remembering the presented material. Cognitive load when using digital virtual learning environments is especially hard to manage due to the same environment where there is likely to be a lot of multimedia materials and information that could be otherwise overbearing unless the information is well organized. As emphasized by Ouwehand et al. (2025), one of the strategies of lowering extraneous cognitive load is to use instructional design that involves content division and interactive multimedia. Teachers always have the advantage of dividing content into small pieces and incorporating multimedia to support the learning process to make sure that students can pay attention to necessary contents without mental overload. This becomes especially crucial in the case of digital environments, where students can be swarmed with information as well as different media content.

Modality, segmenting, and signaling are also important principles to apply to minimize cognitive load. Skulmowski and Xu (2022) state that such principles of CLT allow to guide the attention of the learners and provide them with the necessary cognitive processing. As an example, the modality principle, i.e., the presentation of information in a visual and auditory channel, has been observed to play a role in alleviating the cognitive overload due to stimulation of different cognitive pathways at a time. This organized multimedia learning technique assists a learner to digest information in an enhanced manner and memorize it without straining the working memory of the learner.

Self-Determination theory

According to Van Loon et al., (2012), the theory focuses on the heart of the intrinsic motivation in learning; therefore, the motivation is written in three factors that include autonomy, competence and relatedness. Autonomy is the motivation to control the learning process, competence means the concept of its success and perfection, and relatedness means the necessity of valuable relations with other persons in the learning environment. The fulfillments of such needs increase the chances of the learners becoming involved with the content and performing (learning) perseverance. As indicated by Salikhova et al., (2020), digital learning environments are capable of motivating students through facilitating independence, self-control, and constant feedback. Through providing more personal agency to students (such as by letting students learn at their own pace, or having flexible course choices available) the instructor can foster intrinsic motivation and enable the student to decide how and what to learn. Moreover, feedback which aids the construction of competence and advises is considerable in the continuation of motor empowerment since it makes learners consider that their attempts are bringing them to command and victory. Furthermore, the need to be connected to other people, which is called relatedness, is particularly relevant in digital contexts of learning. Students get a sense of connection and support when they are given the chance to communicate with each other, as well as the lecturer, either in discussion forums, involving

group projects or peer marking, among others. Van Loon et al., (2012), such a sense of social support promotes motivation, since the learner believes that their time spent learning is treasured, as well as the fact that learning is a community.

Information Overload in Digital Learning

Information overload is common in online learning scenario, with learners being constantly exposed to a high level of information. According to Shahrzadi, Mansouri, Alavi, and Shabani (2024), the information overload phenomenon occurs in the case when learners are shown more information than they can cognitively process, which drives them to cognitive exhaustion and loss of interest. This problem is especially acute in the digital sphere, where these students should compete with the avalanche of multimedia material, notifications, and various resources on the Internet. According to Skulmowski and Xu (2022), instructional designers can alleviate the information overload issue, by organizing digital learning activities to ensure that students could process the information in an effective manner. They may include dividing knowledge into small, manageable portions (concept referred to as segmentation) as well as offering a set of precise and narrow instructions that will sequentially walk the scholars through the subject matter. Extraneous cognitive load can be reduced through removal of unnecessary details or distractions which can enable the learners focus on the main content bringing improvement in learning.

Another aspect that is important is how multimedia elements are used in a manner that enhances the learning rather than pushing the learner. Complying with the CLT principles, including indicating the significance of the information and making sure that multimedia does not overload the cognitive capacity of a learner, educators will be able to introduce the digital learning environment that will keep the learner more engaged and minimize the risk of information overload. The method will not only allow the students to manage their cognitive assets more effectively but will also enable them to learn and recall the material more effectively.

Balancing Motivation and Cognitive Load

Cognitive overload and the importance of high-level motivation is one of the most prominent issues in the realm of digital learning. Skulmowski and Xu (2022) underline that instructional design should balance the two simultaneously: cognitive constraints of the learners and the motivational approaches required to maintain distribution. In the absence of proper information management, the information overload may result in cognitive exhaustion and demotivation thus undermining intrinsic motivation needed to ensure effective learning. The addition of strategies that lower the extraneous cognitive load, as informing the tasks and utilizing multimodal content, may enable educators to make the learning process interesting without overwhelming students or losing their motivation. According to Salikhova, Lynch, and Salikhova (2020), the use of SDT as a part of a digital educational process can create a system able to support the process of motivation, and, at the same time, control cognitive load. In order keep students interested, teachers should provide support to such fundamental needs as autonomy, competence, and relatedness, especially when high-cognitive complexity is imposed on them. Moreover, minimizing the extraneous cognitive load by using definite task structure and multimedia components, an educator will be able to provide an atmosphere in which students will find motivation to deeply immerse in the task without becoming exhausted by the topic.

METHODOLOGY

The research method used in this study is qualitative, and it focused on a systematic review of available literature to identify the connection between cognitive load, motivation, and digital learning environment design. The qualitative method can be exceptionally well adapted to the proposed research, though, because it will be able to yield more insightful information regarding the role of instructional design in generating cognitive load and promoting each individual motivation, particularly in the digital environment. It is determined by synthesize the current literature to offer information as to how various instructional techniques such as the design of learning activities, feedback response and multimedia applications impact on the thought load, as well as the intrinsic motivation of the students. The qualitative analysis will assist in the definition of the effective instructional strategies that will prevent cognitive overload as well as create a motivation and make sure that the digital learning environments will be optimal both in their cognitive processing and in terms of student engagement. By means of this synthesis, the paper aims at offering helpful suggestions on the subject of enhancing instructional design in online education.

RESULTS

Examination of digital learning environment reveals that well-designed instructional plans have the ability of reducing hist being cognitive load that results in increased student engagement. One of the significantly required aspects of a well-organized online course is to reduce cognitive load and introduce a deeper learning experience by dividing the tricky information into smaller and digestible units. Ouwehand et al. (2025) explain that segmented instructions improve the digestion of the material as the students can complete instructional specific content as a block. Integration of multimedia sources, as well as videos, infographics, and interactive assignments also becomes instrumental in promoting understanding through the engagement of various sensory pathways. The result of these design strategies is a direct outcome of reduced extraneous cognitive load which is brain burden related to inadequately organized stuff. This lessening of unnecessary burden will help students pay a little more attention to the information itself, i.e., not get distracted or otherwise overloaded by the lack of clarity or influx of information.

As per Cognitive Load Theory (CLT), this form of instructional design contributes towards making sure that there is no overloading the working memory of a student as they will then be able to allocate mental resources towards understanding and storing information. This finding indicates how seriously essential it is to organize learning activities treating cognitive capabilities of students, thereby making it possible to achieve successful learning outcomes (Ouwehand et al., 2025). As indicated in figure 1, Learners have fewer cognitive overload issues when they are given the rightly chunked instructional materials and consequently have better performance and recall of the material.

Figure 1: Conceptual framework: cognitive load optimization AI-powered AL.



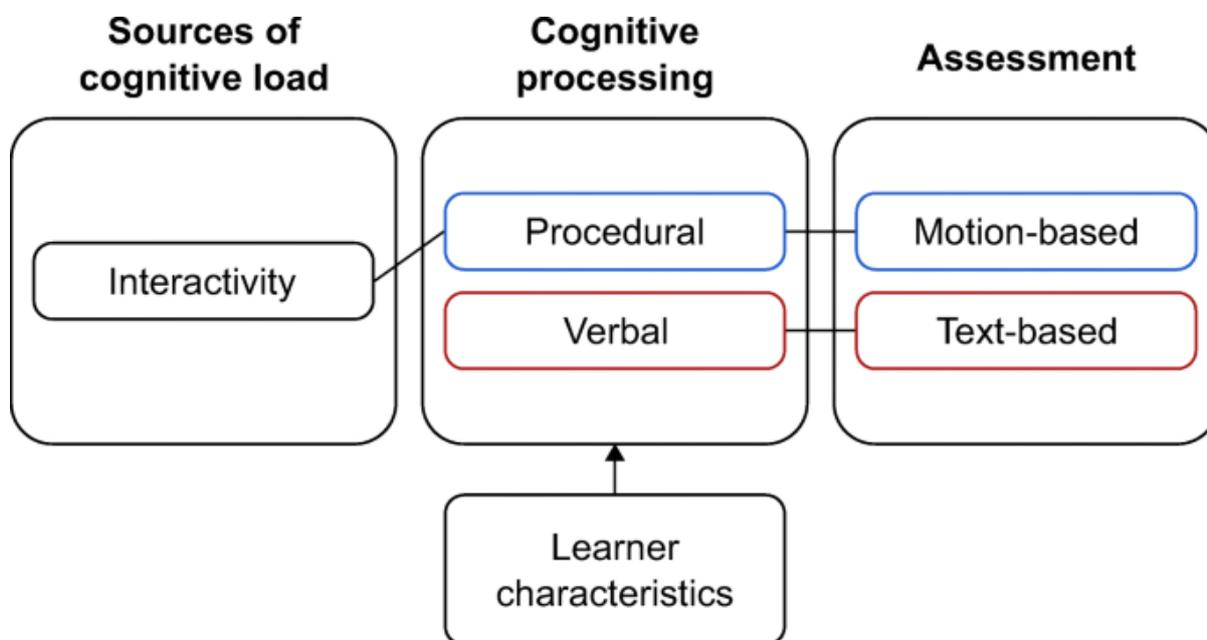
Source: (Gkintoni et al., 2025)

In addition, SDT emphasizes that motivation is still the key facet of the learning process. Van Loon et al. (2012) pose the argument that, when activities in digital learning match these basic psychological needs, students face a higher possibility of being motivated and active. Personalized learning paths in digital learning environments can be used to foster autonomy by having the students make choices on how well they want to learn. Competence can be fostered by providing clear directions, positive goals, and feedback that enables the students to monitor their progress and have a sense of achievement. Relatedness is supportive, and it is one aspect that is frequently neglected on the digital front, but it is enriched whenever there are group work or peer interactions because they all help to make the students feel that they belong in a learning community.

The findings also indicate the essence of maintaining a balance between the complexity of content and the structure of the task. Shahrzadi et al. (2024) reported that even the positive effect of exposure to large quantities of information may result in overloading the learners when the information is not properly structured. Such overload leads to a sense of feeling uninterested and slowed motivation, as students are unable to process and rank the information. Conversely, well designed learning activities that cut down the content into small and manageable portions give the students time to accumulate their knowledge and not be overwhelmed by the content. Such gradual burst does not only alleviate cognitive emotional load but also makes the students feel progress and success clearly. When students have a say in planning out their work and it is clearly delineated, they feel more in control of their learning process, which may contribute to their increased intrinsic motivation greatly. Besides, multimedia effects used to facilitate content understanding and self-regulatory activities incorporated in terms of reflective exercises also stimulate pressure and diligence. Digital learning environments can increase not only motivation, but also learning outcomes, due to

students being given proper instructional support and managing cognitive load so that the students are not bored and they remember the material. Figure 2 shows a result of all the possible combinations: sources of cognitive load, types of cognitive processing (procedural and verbal), and methods of assessment (motion-based and text-based), they are affected by the characteristics of learners.

Figure 1: Cognitive Load, Processing Types, and Assessment in Learning



Source: (Skulmowski & Xu (2022)).

DISCUSSION

The literature search findings underline the pivotal importance of the process of organization and structuring digital learning environment to reduce possible cognitive overloads with the simultaneous development of intrinsic motivation. The application of CLT and SDT, an educator can achieve the desired balance between cognitive demand and motivation that a digital course establishes. Instructional design that aligns with these needs not only enhances learning outcomes of the students, but also enhances considerably their overall experience in digital environments. Such combination of structured content and motivation regulations will result into better learning experiences and long-term interest maintenance, particularly in intricate multimedia-laden environment.

Skulmowski and Xu (2022) state that the cognitive load management is an important issue in the context of digital learning since learners can be overwhelmed with too much multimedia information. It may cause mental overload where students will not be able to process the information as they are overwhelmed. The instructional designers can address it by reducing extraneous cognitive load using strategic design decisions, namely separating content into smaller, digestible sets and implementing a multimedia tool that benefits the learner, instead of overwhelming it. A digital learning environment that is created by taking into consideration the ideas of CLT will ensure that the learners better process the information and retain it, which will increase their chance of excelling in their studies. Though the efficient multimedia application, easy structure, and simplified presentation the ability of students to read the material constructively can thereby be increased.

Furthermore, the implementation of CLT to the digital context helps to emphasize the importance of paying special attention to the equilibrium between intrinsic and extraneous cognitive load. When these aspects are correctly balanced, then chances are higher that students will learn more in-depth, instead of just having to go through the formalities of content consumptions. A reduction in extraneous load enables the cognitive resources available to students to be focused on the content to be learned and generate an useful relationship; a direct result of which is improved retention and transfer of knowledge. Besides coping with the cognitive load, motivation is another important attribute of successful digital learning environments. Van Loon et al. (2012) maintain that motivation is a key factor when it comes to the involvement of the students and that this is the case especially in digital learning environments where students sometimes end up feeling lonely. SDT suggests a scheme to fulfill the intrinsic needs of students including their autonomy, competence, and relatedness that directly affects their levels of motivation. Educators can fulfill the desire of the students to have autonomy by giving them the choice over how they learn, eg. give them the opportunity to choose their path in the learning experience or choosing whether they learn at their own pace or not. The students become motivated when they get feedback about their development and achievements in a compartment that views them as competent in their current educational state, which only supplements the feeling of competence. Finally, the inclusion of the opportunities to work with colleagues or interact with instructors gratifies the need to belong (relatedness) and helps to motivate students to remain engaged in the process of learning.

Results obtained also indicate that effectively designed digital environment or in other words one that is fully characterized by an adjustable level of cognitive load and level of motivation not only can help students to process the information more efficiently but it also results in the elevated satisfaction and academic achievement. Students who receive clear instructions, are offered digestible pieces of information and have access to effective feedback are likely to display more satisfaction, as Shahrzadi et al. (2024) have demonstrated. Learners stay motivated and determined to see a task through when they instinctively trust in the instructional design and their psychological needs are satisfied. Use of multimedia, ensuring proper directions of tasks that they are supposed to perform as well as placement of effective feedback mechanisms all help to keep the students active and motivated as they continue with their learning process. Once the concept of digital learning environments supports and motivates a beneficial framework to reduce student cognitive overloading, it is possible to process the information better, use it effectively, and thrive in academic activities. The results imply that digital learning environments must be well planned and integrate cognitive and motivational principles to create maximum learning.

CONCLUSIONS

This paper highlights the important nature of instructional design in achieving the balance between cognitive burden and motivation in online learning. Using the two theories, instructors can design well-planned learning activities that will reduce cognitive load as well as consciously support the intrinsic motivation of students. The results provide key indications that matching activities with the cognitive abilities and psychological needs of students is critical in terms of increasing engagement, educational performance as well as general satisfaction. With digital learning developing day by day, the necessity to conduct additional research on the topic of ways in which the new technologies and effective learning methodologies can be used to minimize the cognitive load and facilitate motivation grows. New research directions need to be concerned with the implementation of such tools as gamification and adaptive learning technologies that provide personalized learning experiences and might better meet the cognitive and motivational requirements of the learners. Exploring

how higher technologies can be integrated into instructional design, teachers can contribute to making learning environments more appealing and efficient and help develop cognitive skills and intrinsic motivation, thus enhancing the outcome of learning digital education.

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