

Discussion on Psychological Factors Supporting Online Learning

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ABSTRACT

At present, some scholars have conducted research on online learning from a psychological perspective. Based on this, from the aspects of learners' meta-cognitive ability, learners' original knowledge base, learners' motivation, learners' learning styles, etc., the psychological factors required for online learning in the adult-oriented modern distance education environment are discussed and analyzed, aiming to provide reference opinions for adult learners to better conduct online learning and for online course designers to design a better online teaching environment.

Keyword: Modern distance education; online learning; psychological characteristics

CHARACTERISTICS OF ONLINE LEARNING

In the online learning environment, learners can choose course content, teaching progress and learning methods according to their own characteristics and interests, ask learning questions at any time and get answers in a timely manner, and have strong autonomy in learning behavior. Therefore, online learning is a learning method that is conducive to establishing a student-centered learning model. This learning method fully reflects the subjectivity of learners and has a great role in cultivating independent working ability and innovative spirit.

The rapid expansion of online learning, particularly in adult distance education, necessitates a deeper understanding of the psychological mechanisms that underpin successful learning outcomes in these environments. While the technological and pedagogical aspects are often emphasized, the learner's internal psychological state is a critical determinant of engagement and achievement. This paper therefore seeks to systematically analyze key psychological factors—namely metacognition, prior knowledge, learning motivation, and learning styles—to provide a coherent framework for both adult learners and instructional designers.

From a spatial perspective, online learning can be conducted anywhere with multimedia computers and networks, and you can also learn courses from across the ocean, breaking through the limitations of space. In terms of teaching time, due to the use of modern educational technology, it breaks through the limitations of fixed teaching time. Online learning activities in the modern distance education environment can be carried out at any location that can provide multimedia computers and networks, and at any time, without being restricted by time and space.

Online learning in modern distance education can make use of all available learning resources provided by the Internet. Learners can not only make use of the rich resources such as multimedia teaching courseware, lesson examples and resource libraries provided by the modern distance education environment, but also obtain rich teaching resources provided on the Internet through retrieval and downloading methods, and these resources are shareable. Learners share the teacher's information, form interactions with the teacher, and can obtain guidance from the teacher. Learners can also share information with each other.

DISCUSSION ON PSYCHOLOGICAL FACTORS AFFECTING THE EFFECT OF ONLINE LEARNING

Hill and Hannafin (1997) identified five main factors influencing the quality of distance learning: meta-cognitive knowledge, perceived orientation, perceived self-efficacy, system knowledge, and prior subject knowledge. Building upon previous research and considering the characteristics of online learning in the modern distance education environment, this study focuses on exploring the different impacts of meta-cognitive abilities, learners' existing knowledge, learning motivation, and learning styles on the learning outcomes of online learners, and proposes some measures to improve these abilities.

A. Meta-cognitive ability is the main factor affecting the learning effect of online learners

Meta-cognition was first proposed by American child psychologist J H Flavell(1976). He described meta-cognition as: an individual's knowledge about his or her own cognitive processes and results or other related matters, as well as the active monitoring and continuous regulation and coordination of cognitive processes based on cognitive objects in order to complete a specific goal or task.

Meta-cognition is the knowledge and ability to regulate cognition (cognition). It includes two major aspects: meta-cognitive knowledge and meta-cognitive regulation. Network meta-cognition is the specific application of meta-cognition in the autonomous learning environment of online learning. It is learners' self-understanding of their own online cognitive activities and self-regulation of online learning activities. In online learning, learners' meta-cognitive abilities are mainly manifested in: whether learners can firmly grasp the learning goals and determine the next learning plan; whether they can be aware of their position in the system in learning, effectively filter information, and control learning activities to avoid interference from irrelevant information; whether they can choose learning content presented in appropriate media based on their own cognitive style; whether they can reflect on learning effects, constantly regulate and improve their own learning methods and learning methods, and form effective learning methods that are most suitable for their own personality characteristics, etc. In traditional education environments, learners' self-monitoring ability still has an important impact on learners' performance. Network and distance education environments are open and flexible, and network meta-cognition ability plays a more important role in learners' learning.

Contemporary research continues to underscore the pivotal role of metacognition in online settings. According to Broadbent and Poon (2015), self-regulated learning strategies, which are underpinned by meta-cognitive awareness, are significant predictors of academic success in online higher education. Furthermore, interventions designed to prompt metacognitive reflection, such as guided self-assessments and learning journals, have been shown to significantly enhance learners' ability to monitor and control their learning processes, leading to improved performance (Jansen et al., 2020).

"Learners with high Internet meta-cognition ability can appropriately use self-regulation and self-monitoring strategies, effectively determine learning needs, evaluate, supervise, review and modify their Internet learning. Modify their own online learning strategies in a timely manner, thereby showing higher divergent thinking and the ability to locate information, and showing higher online learning quality." On the contrary, learners with low online meta-cognitive ability cannot self-regulate and self-monitor online learning activities well, and their online learning quality is often not as high as learners with high online meta-cognitive ability.

The online learning environment is different from the previous traditional learning environment. It changes the absolute dependence of learners on teachers, allowing learners to independently arrange learning time, learning progress and even learning strategies. Learning strategies directly affect each stage of learning activities. In order to improve the learning efficiency of online learners, we promote the improvement of learners' online meta-cognitive abilities from the following aspects:

(1) Strengthen guidance for online learners on meta-cognitive knowledge.

Flavell believes that meta-cognition consists of three parts: meta-cognitive knowledge, meta-cognitive experience, and meta-cognitive monitoring. Among them, meta-cognitive knowledge is an important factor

affecting learners' meta-cognitive abilities. At each stage of online learning for distance learners, attention should be paid to increasing guidance and assistance on meta-cognitive knowledge related to online learning, actively guiding learners to apply meta-cognitive knowledge to online learning, and cultivating and improving learners' awareness and initiative in learning meta-cognitive knowledge. Online learners should not forget to accumulate learning strategies during their learning period and should be able to flexibly apply different learning strategies.

(2) Train online learners in their network meta-cognitive monitoring abilities.

Meta-cognitive monitoring is also a component of meta-cognition. Based on certain basic knowledge, learners' self-monitoring level of learning becomes a key factor affecting their learning success. Even though adult learners have strong self-discipline ability, online learning is different from traditional learning. Putting forward meta-cognitive monitoring requirements for adult learners in stages will achieve better results. At the beginning of online learning, organizers of distance education can require learners to formulate strict learning goals and implementation plans, and provide reference standards for effective monitoring; during the learning process, constantly remind learners to have goals in mind, strengthen the analysis of their own characteristics and learning tasks, and ensure the successful completion of the learning plan; after learning, guide learners to review the problem-solving process, carefully analyze the errors that occurred during learning, and compare the selected learning strategies to help learners evaluate their learning. Evaluate the learning results, summarize the experience and lessons learned in the past, and lay a solid foundation for future learning.

B. Learners' existing knowledge provides the possibility to improve online learning effects

System knowledge can help online learners interact with the learning system in the online environment, choose effective operations, etc., thereby reducing the learners' inability to locate and frustration during the learning process. In an open online learning environment, insufficient system knowledge will limit learners' application of the online learning system. Some scholars have pointed out that the increase in learners' system knowledge does not necessarily guarantee their learning success, but system knowledge can help learners interact with the system in the network environment, choose effective operations, etc., thereby reducing the learner's inability to locate and frustration during the learning process. This is crucial for learning in the network environment. Most online learners in modern distance education environments are adults, and their basic network operations and corresponding computer knowledge are relatively lacking. Online course designers need to take these characteristics of adult learners into consideration and design teaching software to be as easy as possible for learners to operate.

Prior subject matter knowledge refers to the knowledge and experience that learners have in the knowledge area they are learning and exploring. Learners' familiarity with the professional domain knowledge required for learning will inevitably promote their choice of efficient learning strategies to achieve better learning results. Learners with rich knowledge of the previous topic have an advantage over learners with less knowledge of the previous topic when using the online environment to learn. Rich prior subject knowledge can help learners choose more effective keywords and topic terms for information retrieval, integrate old and new knowledge, and enrich, improve and improve their current field. Therefore, learners' acquisition and accumulation of previous subject knowledge should be strengthened. Prior subject knowledge also affects the ability to synthesize new information into a whole and retain it. According to comparative studies on the problem-solving processes of experts and novices, it can be seen that the original knowledge of novices in a certain field does not have a good organizational structure, so it is difficult to flexibly apply it to new environments. Most of them use the strategy of memorization and recitation to learn new knowledge, which affects the learning effect to a certain extent. The original knowledge of experts in a certain field has a good organizational structure and can quickly adapt to new structural changes. In a hypertext environment, experts browse information more purposefully. They have a clear mental representation of the knowledge structure in this field, so they can allocate different time to different information and adopt different learning strategies. [6] Online learners in the modern distance education environment are not necessarily experts in the fields involved, but most learners have rich practical experience, rich professional knowledge, and strong mental representation of the knowledge structure in this field. Therefore, the learner's previous subject knowledge can have a certain impact on the online learning effect, but in this environment, its impact is not as great as the system knowledge on the learning effect in the modern distance education environment.

C. Learning motivation, especially cognitive drive, is the guarantee for achieving good online learning results.

The so-called learning motivation is an inner process or internal psychological state that arouses individuals to carry out learning activities, guides behavior toward certain learning goals, and maintains, regulates and strengthens such learning activities. The main reason why online learners in the modern distance education environment choose the Internet for learning is that online learning is not limited by time and space. It is a learner-centered autonomous learning that requires learners to actively adjust learning strategies according to their own learning abilities and learning tasks. Therefore, this learning model has high requirements on learners' learning motivation, which is also the guarantee for achieving effective online learning results or even efficient online learning results.

Regarding the components of achievement motivation, D.P. Ausubel proposed three types of drives:

1. Cognitive drive. This is a need to acquire knowledge, skills, and the ability to identify and solve problems. It is often manifested as psychological factors such as curiosity, thirst for knowledge, exploration, and manipulation;
2. Self-improvement drive. This is a need to view academic achievement as winning a corresponding status. It is often manifested as psychological factors such as self-esteem, a sense of honor, self-confidence, and a sense of competence;
3. Affiliation drive. This is a need to strive to do well in studies and work in order to gain the approval and recognition of elders (parents, teachers) and peers. It manifests as a sense of attachment. Among these, cognitive drive has a greater impact on the effectiveness of online learning than the latter two.

This alignment with cognitive drive is strongly supported by Self-Determination Theory (SDT), which posits that intrinsic motivation is fueled by satisfying the psychological needs for autonomy, competence, and relatedness (Ryan & Deci, 2020). The autonomous nature of online learning directly supports the need for autonomy, while well-designed courses can foster competence through timely feedback and manageable challenges. Therefore, online course designers should aim to create environments that not only present information but also nurture these innate psychological needs to sustain motivation and promote deep learning.

Learning motivation is the same as all other psychological activities of people, and its changes have certain rules. In online learning, if learners and educators can consciously follow these rules and use these rules rationally, it will help improve learning behavior and enhance learners' online learning effects. The rules of learning motivation include:

(1) The law that learning motivation is inspired by external objective conditions. In online learning activities, there are often many external conditions that attract, motivate, and induce learners, forming corresponding learning motivations. External learning motivation can have a certain impact on online learning activities. Moreover, most adult learners need diplomas and academic qualifications. The thirst for knowledge seemed less intense.

(2) Organizers of modern distance education should make better use of this principle, employing more material rewards and performance evaluations to motivate learners' external learning motivation. Specifically, this can be achieved by assessing learners' learning outcomes at each stage and publishing the results. Those who achieve good results in a stage can be rewarded with Q coins or real-world material rewards, thereby stimulating learners' external learning motivation.

(3) The law that learning motivation is transformed from internal psychological factors. The generation and existence of learning motivation can not only be stimulated by external conditions, but also require the transformation of internal psychological factors. In learning activities, there are many internal psychological factors that can be transformed into learning motivation, including: need for learning, desire, curiosity, thirst for knowledge, interest, emotion, belief, ideal, three hearts (self-esteem, self-confidence, competitiveness), three senses (sense of responsibility, obligation, sense of honor), etc., which can be transformed into learning motivation, thereby motivating students to pursue learning goals, improve learning behavior, and improve

learning effects. The learning motivation transformed from these internal psychological factors is called internal learning motivation. Internal learning motivation has a greater impact on learning activities than external learning motivation. In online learning, learners themselves must pay special attention to cultivating internal learning motivation, choose courses that have strong curiosity about the online course itself, and be willing to actively seek answers to questions in a non-linear environment that requires learners to continuously explore. In the design of online courses, educators should use appropriate strategies to attract learners' attention to learning content and cultivate interest in learning, such as: appropriate use of short stories, cases, and humor; appropriate use of animation, music and other multimedia forms; presentation of the goals of learning tasks, etc.

D. Pay attention to the impact of differences in learners' learning styles on learning outcomes

Learning style refers to all the psychological characteristics of learners who perceive and respond to different stimuli. Learning style includes sensory channel preference, cognitive style preference, etc. Among them, cognitive style involves learners' preferred and habitual ways of organizing and representing information, and is closely related to the regulation of network-based learning processes.

(1) Sensory channel preference is a guarantee of the quality of online learning.

From a perceptual perspective, learners are mainly classified into three types: visual, auditory, and kinesthetic. In the context of online learning in modern distance education, we mainly discuss visual and auditory learning. Although we use both types of sensory channels simultaneously to varying degrees during learning, each learner has their preferred type. Generally speaking, in online learning environments, visual learners are good at learning through visual stimuli and prefer to receive information through various visual stimuli such as pictures, charts, videos, and films. They have a good understanding of the representational structure of hypertext learning environments, but they are not very good at remembering specific textual information. They are suitable for using concept maps to organize information and for learning in created virtual scenarios. Auditory learners prefer to receive new knowledge by listening to others explain. These learners prefer information in text or audio format in online course learning environments, which can achieve higher quality learning results. In online teaching environments, no single material can satisfy all learners. Studies (Butler and Mautz, 1996) have shown that learners who prefer visual representations are better able to learn multimedia representations, while those skilled in auditory representations are more likely to be misled by multimedia. Therefore, the presentation of learning materials should vary to suit the needs of learners with different preferences.

This principle is a core tenet of the Cognitive Theory of Multimedia Learning (CTML). CTML suggests that learning is more effective when instructional materials are designed in accordance with how the human mind works, accounting for different channels of processing (Mayer, 2020). For instance, visual learners benefit from the strategic use of graphics, charts, and animations to explain complex processes, while auditory learners benefit from clear narration or downloadable audio summaries. A one-size-fits-all approach to multimedia presentation can create extraneous cognitive load for some learners, thereby hindering learning. Thus, providing content in multiple formats or offering learner-controlled options is essential for accommodating sensory preferences.

(2) The impact of different field orientation styles in individual cognitive approaches on the quality of online learning.

Cognitive style is "understood as a preferred and habitual way for individuals to organize and represent information" and is an important element in learning style. Among the many researchers of cognitive styles, the most influential one is the American psychologist Herman Witkin. From the field orientation dimension, he divided field-oriented styles into field-independent and field-dependent people based on their degree of dependence on the external environment. People with field-dependent characteristics tend to view things in a holistic manner and are easily affected by environmental factors in perception; people with field-independent characteristics tend to accept external stimuli with an analytical attitude and are less affected by environmental factors in perception. In studying online courses, these two types of learners exhibit different characteristics. Early research (McLeod & Adams, 1979) showed that field-dependent students perform well under rigorous instruction, while field-independent students perform better in discovery-based, less instructional teaching methods (such as distance education). Although online learning environments cannot provide rigorous instruction, the cognitive

"disadvantages" of field-dependent learners are not immutable in online teaching environments. As long as the teaching methods and content presentation are suitable for their characteristics, the potential of these learners can still be stimulated, leading to better learning outcomes. This places higher demands on instructional designers; whether online courses can be well-matched to the learners' individual learning styles is directly related to the quality of their online learning.

CONCLUSION

The online learning environment in the modern distance education environment creates a good psychological atmosphere for learners. The network can meet the needs of learners with different learning styles and different learning motivations, allowing learners to comprehensively and fully develop their personality psychology. The creation of an online learning environment is learner-centered. When creating, it is necessary to fully consider the learner's prior experience with the Internet and learning content, the learning motivation for the Internet and the metacognitive ability in the Internet, the learning style in online courses, and certain personality characteristics of the learner. This can promote effective interaction between online courses and learners, and promote online learners to achieve effective learning results. Only when designers of online courses have a deep understanding of learners, teaching content and teaching environment can they create a high-quality online learning environment for learners, thereby ensuring that learners obtain effective learning results in this course environment.

In conclusion, effective online learning in distance education is a complex interplay of psychological factors where meta-cognition acts as the regulator, prior knowledge provides the foundation, intrinsic motivation serves as the engine, and accommodating learning styles ensures the pathway is clear. Future research should empirically validate the interactions between these factors within adult learning populations and explore the role of emerging elements such as emotional regulation and social presence. Moreover, leveraging learning analytics and artificial intelligence to create adaptive learning systems that respond to individual psychological profiles presents a promising frontier for personalizing and enhancing the online learning experience.

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