

Paying Attention to the Online Learning Environment: The Importance of a Low-noise Environment

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Abstract: The learning environment has been recognized as an important factor affecting the quality of offline learning. The existing literature demonstrates that the learning environment also has an impact on online learning and it is more influential than most factors. Due to the flexibility of the learning environment, both the positive and negative effects on online learning are magnified compared to offline learning. Noise is a vital component of the learning environment. The research results of multiple scholars show that noise has adverse effects on learners' physiology and psychology, and the negative effects of noise on learning efficiency cannot be ignored. With regard to the impact of noise on online learning, noise can lower the quality of online learning by impairing the learner's reading ability, memory capacity and maths and literacy ability. Especially, the noise of the online learning environment is more uncontrollable than offline learning, which magnifies the negative impact of noise on learning efficiency. Finally, this paper makes recommendations for learners, teachers and schools respectively, like using noise-canceling headphones or earplugs and removing noise sources in advance.

Keywords: Online Learning, The Learning Environment, Noise

1. Introduction

YouIn 2020, the COVID-19 pandemic broke out around the world. Traditional teaching model was severely impacted and many countries implemented nationwide school closures. As the first country affected by the pandemic. in order to ensure the safety of teachers and students while maintaining normal teaching activities, online education played a key role in the national campaign for "classes suspended but learning continues". Various schools at all levels across the country actively organized online education activities, fully demonstrating the significant advantages of online learning in terms of autonomy, interactivity and openness. The 48th Statistical Report on the Development of China's Internet Network [1] issued by the China Internet Network Information Center (CNNIC) pointed out that as of June 2020, the quantity of Chinese Internet users exceeded one billion, with a total of 1.011 billion, of which 325 million are online education users, accounting for 32.1% of the total number of netizens, forming the largest digital society in the world with the strongest penetration of Internet applications. Most countries in the world, like Italy, Japan, South Korea and the United States and other countries also transitioned from offline education to online education. Although online education cannot completely replace offline education, it will gradually become an indispensable teaching method in education in the future.

Due to the autonomy and self-help characteristics of online education, learning environment of each learner is difficult to be monitored and controlled by the school and teachers. Online learning environment may have a certain impact on the quality of online learning and thus challenge their learning effectiveness. It is important to understand how the learning environment affects online learning in order to improve the quality of online education and build a modern education information system. Therefore, this paper selects the online learning environment as the main research perspective and focused on whether and how noise affects online learning.

2. The Impact of the Learning Environment on Online Learning

2.1. Whether Environment Affects Online Learning

Environment is an important external condition that affects student learning and a good learning environment can strengthen students' active construction of course content and promote their ability development. Offline Education practice shows that the learning environment is one of the key factors of influencing student's learning efficiency which could help students establish study habits. Creating a good learning environment is the historical mission of colleges and universities which meets the needs of students' growth and development. Therefore, most schools attach great importance to the construction of leaning environment, establishing and improving related regulations and long-term mechanism.

As for online education, the learning environment remains an important influencing factor of concern to many scholars. investigated the problems of graduate students' adaptation to online learning and concluded that the main influencing factors are personal factors and environmental factors and environmental factors include teacher support, course content, and the learning environment. Likewise, Wu Dandan [3] points out that there are three main factors that affect the adaptation of college students to online learning: learners themselves, teachers, and the learning environment, with the learning environment being the key factor to teaching guarantee.

Additionally, it should be noted that the learning environmental is more influential among the factors. In a study on the factors influencing college students' learning engagement in online learning, Yang Mei [4] studied the influence of environmental from various perspectives such as tool ease of use, resource availability and comfort degree, whose results showed that environmental factors were significantly and positively correlated with behavioral engagement, cognitive engagement, emotional engagement, and social interaction engagement. Li Fenglin [5] used statistical analysis method to analyze whether the hypothesis of each influencing factor is established, test and modify the preliminary model. Her study found that learning attitude, learning motivation, learning self-efficacy, teachers' teaching, network teaching platform, course information quality and learning environment have a significant positive impact on the learning adaptability of higher vocational students during the epidemic period. Taken as a whole, The sequence of the effect values from high to low is: network teaching platform (0.412), learning environment (0.334), learning attitude (0.277), course information quality (0.246), learning attitude (0.210), teacher teaching (0.190), study motivation (0.189) and study self-efficacy (0.168).

2.2. How Environment Affects Online Learning

Online learning is not limited by the time and place of traditional education, and its environment is extremely flexible, which provides an alternative for students unable to attend offline courses for reasons such as pandemic, work or family obligation. In addition, as an crucial component of the online learning environment, online education platforms can provide students with personalized teaching and learning and allow students to access online education resources and adjust their learning

process according to their interests, needs and learning pace, enabling them to better grasp what they have learned and improve their learning efficiency.

Although the online education platform partially replace offline teaching and meets students' diversified learning needs, it faces new environmental constraints such as the requirements for network and software functions. What's more, there may be conflicting adaptations between the online learning environment and the real surroundings. On the one hand, in the online learning environment, the lack of face-to-face emotional communication and knowledge transfer between teachers and students as well as among students greatly reduces the sense of existence of both teachers and students, and teachers' teaching and students' learning motivation may be negatively affected as a result. On the one hand, the Internet integrates all kinds of information in web pages and platforms, and the mixed information easily attracts students' attention. The platforms rely on big data technology to track and push messages to users' preferences, which makes it impossible for students with weak willpower to fully concentrate on online learning. The noisy learning environment also affects students' adaptation to online learning. In the research analyzing the level of engagement of Thai international students in online Chinese learning, Yang Yayun [6] finds that among many environment factors, the most significant influence is the degree of perfection of the online education platform. If the degree of perfection is good, it has a positive impact on students' engagement in online learning. In addition, poor network conditions and noisy classroom environment lead to low student engagement in learning.

3. The Impact of Noise on Online Learning

3.1. Whether Noise Affects Online Learning

Among all the many environmental factors, noise is one that cannot be ignored. Physiologically, noise may makes students feel exhausted [7]and stressed [8] and may lead have detrimental effects on the learning process. Ruiz et al. [9] points out that high-pitched noise is harmful to pupils' cognitive capacities, which are linked to academic success. Intuitively, noise can affect students' attention and emotions, thus reducing learning effectiveness. Also, noise can interfere with students' concentration and make it difficult for them to understand what the teacher is teaching, as well as making it more difficult for the teacher to explain accordingly. Braat-Eggen et al. [10] conducted a study aiming to reveal correlations between noise disturbance experienced by students and the noise sources they perceive in the open plan study environment whose results study shows that 38% of the surveyed students are disturbed by background noise in an open-plan study environment and students are mostly disturbed by speech when performing complex cognitive tasks like studying for an exam, reading and writing. Lenz et al. [11] found that noise disrupted students' concentration while doing cognitive tasks like math. He et al. [12] examined the correlations between academic work and noise disturbance and the finding revealed that around 38% of students were distracted by background noise and discussion when engaged in cognitively demanding tasks such as reading and writing.

Due to the increased levels of background noise and other distractions that are commonly present at their residences, online students may suffer from the same problem. Hoang et al. [13] made use of a total of 222 college students from 12 universities to conduct a cross-sectional survey and substantiates the hypotheses that students' academic performance (directly shown by students' grades) is influenced by noise with the partial least square method to develop a structural equation model. Their study indicates that noise accounted for 26.8 percent of the dependent variable (academic performance).

3.2. How Noise Affects Online Learning

With regard to how noise affects online learning, its role can be broadly divided into two aspects: the general impact of noise on learning, and the specific impact of noise on online learning.

3.2.1. The General Impact on Learning

Firstly, noise has a negative impact on reading ability. A cross-national, cross-sectional study conducted by Stansfeld et al. [14] identified linear exposure-effect associations between exposure to chronic aircraft noise and impairment of reading comprehension and recognition memory. Papanikolaou et al. [15] explored the effect of traffic road noise on reading ability. This study assessed 676 participants from selected school which were classified into three categories on the basis of increasing levels of exposure to road traffic noise (Low: 55 – 66 dB, Medium: 67 – 77 dB, and High: 72-80 dB) and found that high measured noise exposure at school was associated with worse performance on a reading task.

Secondly, noise has a negative impact on human memory capacity. Zeydabadi et al. [16] assessed the effect of exposure to noise on memory through a cross-sectional study and found that the memory capacity difference was statistically significant between noise and control group which means exposure to higher noise intensity caused worse performance on memory.

Thirdly, noise may do harm to maths and literacy ability. Gao et al. [17] observed significant negative longitudinal associations between performance on literacy and mathematics questions and traffic noise in adults.

3.2.2. The Specific Impact on Online Learning

Because students have a higher degree of freedom in online learning, lack direct supervision from teachers, and even sometimes need to deal with noise problems on their own, the distraction of noise on students' attention will increase compared to offline learning. In addition, since teachers cannot perceive the noise in the students' learning environment, they may not be able to provide timely tutoring to students who are affected by the noise, and students' learning effectiveness may be further affected, and students' willingness to learn may decrease as a result.

3.3. Heterogeneity of Noise Effects on Online Learning

It is worth noting that there may be heterogeneity in the effect of noise on online learning. In the Caviola et al. [18] research, a differential negative effect of listening condition on maths performance emerged in relation to children's age and task difficulty. The youngest children performed better in the quiet and traffic noise conditions than in the classroom noise condition, while in the older children these differences gradually disappeared. The detrimental effect of classroom noise was most evident when the maths task was moderately difficult. With increasing task complexity, the difference between listening conditions faded. These results implies that younger children are more susceptible to the detrimental effects of noise in school classrooms than older children resulting in worse academic attainments and the impact of noise on online learning is heterogeneous in terms of the difficulty level of the learning content.

4. Recommendations

4.1. For Learners

Learners should take steps to minimize the negative effects of noise on online learning. Firstly, find a quiet study environment. Make an effort to find a quiet and peaceful study space, such as studying

in a house or library, to reduce the distraction of noise. Secondly, use noise-canceling headphones or earplugs. Using noise-canceling headphones or earplugs can effectively reduce the distraction of ambient noise, allowing learners to focus more on their studies. Thirdly, remove noise sources from the learning environment in advance: remove or cover up noise sources in the learning environment, such as switching off media devices or using soundproof materials, so as to reduce the impact of noise. Lastly, plan study time according to the course schedule: Plan your study time wisely to ensure that studying occurs during the quietest time periods, such as in the morning or at night, while family members are asleep.

4.2. For Parents

A quiet and peaceful home environment and family atmosphere will be conducive to student learning while a noisy home environment will make it difficult for students to focus and feel at ease when learning. Parents should change their concept of online learning, follow the development of the times and the network environment, pay more attention to the convenience of the network platform to be able to study anytime and anywhere, give their children positive encouragement and learning support, meet their children's basic online learning hardware needs, and pay more attention to their children's mental health and real thoughts. Based on analysis above, parents should actively create a quiet learning environment for children. In addition, according to an assessment of online learning environment [19], children in crowded homes perform worse on standardized reading tests and attain less education than their peers, parents is proposed to provide their children with independent and comfortable private spaces with good sound insulation, reduce family quarrels and conflicts, and allow students to study without distractions and concentrate on their studies.

4.3. For Schools

Schools may have limited control over students' living environments, but they can assist students in mitigating distractions. Noise-canceling headsets. For students suffering from inevitable noise affecting their ability to learn, one of the most effective options is to distribute noise-canceling headphones or headsets for noise reduction. Schools can also provide necessary for students and their families on how to support online learning given their living environments. For example, teachers can provide clear guidance about the learning environments that students need for their classes and advise students on how to communicate their needs with family members (If permitted, teachers can communicate with students' family members directly).

5. Conclusion

The COVID-19 pandemic has driven rapid growth of online learning. whose quality may be influenced significantly by the online learning environment. Therefore, it is crucial to comprehend the impact of the learning environment on online learning. Many scholars have tested the hypothesis that the learning environment has an impact on online learning, and research results have shown that the learning environment closely correlated with quality of online learning and the learning environment carries more weight than most factors. Due to the flexibility of the learning environment, both the positive and negative effects on online learning are magnified compared to offline learning. Noise is an important component of the learning environment. The research results of multiple scholars show that noise has adverse effects on learners' physiology and psychology, and the negative effects of noise on learning efficiency cannot be ignored. Regarding the impact of noise on online learning, on the one hand, Noise can lower the quality of online learning by impairing the learner's reading ability, memory capacity and maths and literacy ability. On the other hand, the noise of the online learning environment is more uncontrollable than offline learning, which amplifies the

negative impact of noise on learning efficiency. In addition, there is heterogeneity in the effect of noise on online learning. Based on analysis above, this paper makes recommendations for learners, teachers and schools respectively.

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