INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN BUSINESS & SOCIAL SCIENCES

Vol 13, Issue 4, (2023) E-ISSN: 2222-6990

A New Paradigm for Higher Education: Unraveling the Complexities of Online Learning Efficiency Amidst the COVID-19 Pandemic

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To Link this Article: http://dx.doi.org/10.6007/IJARBSS/v13-i4/16756 DOI:10.6007/IJARBSS/v13-i4/16756

Published Date: *09* April 2023

Abstract

The COVID-19 pandemic has necessitated a reevaluation of traditional pedagogical models in higher education, prompting a paradigm shift towards online learning. This study employed questionnaires and semi-structured interviews to examine the efficacy of online learning among Jinzhong University students, highlighting key determinants of learning efficiency, including (i) online media quality and network fluency, (ii) instructors' professionalism and charisma, and (iii) students' motivation and self-discipline. The findings indicate the emergence of a novel hybrid education model, which offers considerable advantages but is impeded by factors such as insufficient training, limited bandwidth, and inadequate preparation, ultimately constraining the continuous growth and optimization of hybrid education.

Keywords: COVID-19, Learning Efficiency, Online Courses, Hybrid Education

Introduction

Background

At the end of February 2022, as the epidemic spread from Shanghai to other parts of the country and the risk of the epidemic increased in Taiyuan, Shanxi Province, Jinzhong University decided to postpone the start of the spring semester. It started online teaching procedures for all teachers and students. This is the second large-scale online course offered by Jinzhong University since the outbreak of COVID-19 in early 2020. This time, teachers and students are not unprepared for the online system, which has become an indispensable part of the education field. At present, online courses have become the regular learning of college students. The influence of network fluency of learning platform, teaching style and teaching method, self-discipline and psychological state of students on the efficiency of online courses has become the focus of researchers. Given the COVID-19 pandemic, moving all courses

online has become the new normal, and few previous studies have looked at the effectiveness of online courses (He & Xiao, 2020). Therefore, in the context of the normalisation of the global epidemic, it may become a top priority to focus on the psychological needs of students instead of the emergency online courses and explore the development path of the hybrid education, especially the possibility of the implementation of the hybrid education focusing on practical majors.

The COVID-19 pandemic has necessitated a reevaluation of traditional pedagogical models in higher education, prompting a paradigm shift towards online learning. This study is motivated by the need to better understand the effectiveness of online learning during the pandemic and identify areas that require improvement. By examining the experiences of Jinzhong University students, the research aims to contribute to the development of more efficient and engaging online learning models for higher education.

Literature Review

Online Platform

When the regular operation of the city has been put on hold by the COVID-19 pandemic, online courses have provided a way out for continuing teaching activities. We are wrapped in the virtual network environment and inseparable from the network. Now that entire campuses are moving into virtual environments, what online tools and platforms need to be used, and how they are used become critical to the success of teachers, students, and administrators (He & Xiao, 2020).

Online courses on the market provide various practical and efficient e-learning tools for teachers and students. Online education platforms have played a crucial role during the COVID-19 pandemic (Subedi et al., 2020).The development of information transmission technology, so that online classrooms in sound, screen, interaction and other aspects than more than a decade ago has made significant progress, not only can be comparable with offline courses but at the same time with the elimination of geographical barriers, time differences and other offline courses do not have the advantage (Yang, 2020).

However, there are too many choices of online education platforms, which will also bring trouble to teachers and students in the teaching process of online courses (Pokhrel & Chhetri, 2021). He and Xiao (2020) pointed out that teachers' online education tools and platforms are different from students' preferences, and teachers need to make appropriate adjustments and changes in the teaching process, which requires teachers' ability to use electronic technology. Still, only half of the teachers can proficiently use online education platforms.

In addition, some studies have proved that factors such as students' family income, family network status, electronic devices used in online courses and family learning environment will also affect the learning efficiency of online courses (Chen, 2020).

According to data released by CNNIC (2022), the total number of fixed Internet broadband access users of the three essential telecom enterprises will reach 536 million by December 2021. Among them, the number of selected Internet broadband access users with an access rate of 100Mbps or above reached 498 million, accounting for 93.0% of the total number of users. The number of fixed Internet broadband users with access rates of 1000Mbps or above reached 34.56 million. The Internet penetration rate in China's urban areas is 81.3%, while that in rural areas is only 57.6%. Even though China's Internet access rate is increasing yearly, the network access difference between urban and rural areas cannot be ignored and needs to be solved urgently, which will become a factor affecting students' learning efficiency of online courses.

Online Teaching Skills and Teaching Methods

Teachers' online teaching skills are essential to students' learning efficiency. According to He, there is a clear difference between teachers "knowing" how to use online teaching platforms and tools and "proficient" in using them (He & Xiao, 2020). Teachers work only with the tools they know (Daniel, 2020). While the main focus is on technical tools for online learning, it is tough for teachers who are less familiar with technology, that is, for non-specialist online teachers (Rapanta et al., 2020).

Zhou pointed out that for a long time, China's normal education lacked the cultivation of teachers' online teaching skills. However, online teaching is essentially different from traditional offline classroom teaching. This lack of training will inevitably lead to the lack of teachers' online teaching organisation and management skills. There is also no professional team to develop and produce teaching resources like online education institutions. It can be said that the defects of teachers' ability structure, lack of necessary training and division of labour and cooperation are the profound reasons leading to the poor effect of online teaching (Yang, 2020).

Another factor that researchers generally agree affects teaching effectiveness is teachers' teaching methods. Yang (2020) pointed out that the essential difference between online and offline teaching requires teachers to adopt teaching methods that are different from traditional ones and suitable for online teaching. Instead of simply copying what is taught offline and expecting the same results, teachers must find ways to increase students' attention to ensure the quality of teaching.

In addition to adopting methods different from traditional offline teaching, teachers also need to adopt unique teaching methods in the face of other subjects, grades and students' diverse needs; teachers face more significant challenges in teaching strategies to use in online teaching (Doucet et al., 2020). According to Yang (2020), the teaching content of some majors is very limited in online platform teaching, and the existing online teaching methods may not be suitable for the teaching content of these majors. Taking art education in primary education as an example, music class is not only about learning a song but more about feeling the atmosphere of singing together. Drama education on campus, from students rehearsing programs under the guidance of teachers to performing on the stage in the classroom, watched by teachers and classmates, is difficult to fully reflect and transmit the edify and communication required by aesthetic art education on the network platform. Network education can not only be satisfied with the general knowledge imparted. Still, comprehensive coverage of education requirements should be a weak link to the current network platform education

Whether requiring teachers to improve in-school education skills or innovating online education methods, the goal is to achieve better online learning results. Moving the curriculum online should " help our students feel they are included in the process of rethinking education for a challenging time (Kamenetz, 2020).

The Learning Efficiency

Although online education platforms and teachers' teaching skills and methods are important factors affecting the learning efficiency of online courses, the most critical factor is still the students themselves as the subject. Learning-centred is to give full play to the principal role of students so that students not only master knowledge but also learn to update knowledge and acquire new abilities to adapt to the accelerating change of the world (Yang, 2020).

The mentality of students has individual differences and has a different influence on learning efficiency. Some scholars pointed out that learners with a fixed mindset are difficult to adapt and adjust to the new environment, while learners with a growth mindset quickly adapt to the new learning environment (Doucet et al., 2020).

Different from traditional offline teaching, online teaching lacks discipline and supervision. Online learning requires self-discipline and initiative. Students' lack of motivation is undoubtedly a challenge to the learning efficiency of online courses (He & Xiao, 2020). Learners with innate ambition are relatively unaffected in learning and need minor supervision and guidance, while students with weak knowledge, the disadvantaged group, face difficulties (Pokhrel & Chhetri, 2021).

In addition to students' self-discipline, some scholars pointed out that students' mental health and objective family environment will also affect the learning efficiency of online courses (Barrot et al., 2021). Many students suffer psychological and emotional pain during online classes at home, so they cannot study efficiently.

The study found that some students need to do housework at home, help their parents do farm work, or take care of sick family members, or because of financial constraints and lack of necessary online learning equipment, it is difficult for them to engage in their studies well (Pokhrel & Chhetri, 2021).

Hybrid Education

While educators, schools, institutions and governments face considerable challenges in online education from different perspectives, COVID-19 has also created opportunities to implement online learning initiatives. This requires the field of education to put forward innovative teaching mechanisms to adapt to future learning life.

The lesson learned during the COVID-19 pandemic is that teachers and students or learners should commit to using different online education tools flexibly. Once classes resume, teachers and students should be encouraged to continue using online tools to improve delivery and learning (Pokhrel & Chhetri, 2021). In order to give full play to the advantages of online teaching and achieve better teaching effects in the future.

He and Xiao (2020)pointed out that the teaching experience of COVID-19 will prompt university administrators to rethink how to build a standard online education mechanism that can function more effectively when new emergencies arise. However, even amid the COVID-19 pandemic, moving all courses online has become the new normal, and few previous studies have explored emerging online courses. This suggests that we should pay more attention to the development prospect of hybrid education.

According to Yang (2020), hybrid education to serve the teaching better is an important issue that we need to consider now. Integrating online and offline education is not a simple move from offline education to online education. Although our online education has survived a big test, it is still a copy of offline education. We should take this large-scale implementation of online education as an opportunity to speed up the construction of a new ecology of online and offline integration of education.

Discussion

Research Methods

In this study, the "Questionnaire APP" was used to collect data through an online sampling questionnaire survey.

In quantitative and qualitative research paradigms, quantitative data end up as closed questions and are deterministic in nature because they aim to create easily quantifiable data. Closed closing questions can reveal attitudes, opinions, or behaviours. Open-ended questions are exploratory and provide researchers with rich qualitative data. In essence, they allow the researchers to gain insight into all perspectives on a topic with which they are unfamiliar. Incredibly, the use of open-ended questions does help to inform further quantitative research (Survey, 2022). Compared with the interview method, the given options can guide the interviewees quickly. For the interviewees who are not good at summarising and self-expression, a questionnaire survey may be more beneficial for concluding views and stimulating written expression.

Meanwhile, a questionnaire survey is more suitable for online data collection and more efficient than other data collection methods (Lefever et al., 2007). The interview method, for example, is subject to the outbreak; the interviewer and interviewee are challenging to meet offline and can only take online voice and video calls or text chat to communicate; this communication time is difficult to control. Efficiency is not high, and the energy is limited; if taking the interview method, to interview object is restricted, can be collected by the sample size is far less than the online questionnaires are distributed. However, limited by the circle of acquaintances and too small sample size, it can easily lead to polarisation or deviation of data results, which does not have representativeness and objectivity.

"Questionnaire APP" is a professional online questionnaire survey software in China with complete and powerful functions that can meet this study's data collection needs.

Research Samples

Questionnaires were given to undergraduate students in Jinzhong University, whereby a total of 2858 valid questionnaires were collected. According to the statistics(Jinzhong, 2022), there are about 19,000 students in Jinzhong University, and the questionnaire sampling survey coverage rate is approximately 15.00%.

In terms of grade distribution, 1308 freshmen (45.77%), 656 sophomores (22.95%), 544 juniors (19.03%) and 350 seniors (12.25%) were surveyed. In terms of majors, 759 (26.56%) majored in literature, history and philosophy, 694 (24.28 per cent) majored in science and engineering, 161 (5.63%) majored in management, 174 (6.09%) majored in education, 750 (26.24%) majored in art, and 317 (11.09%) majored in physical education.

Research Results

The overall satisfaction degree of learning efficiency of online courses

The overall satisfaction with the efficiency of online courses was rated as 1-5 from "very dissatisfied" to "very satisfied”. Among the 2858 respondents, 192 (6.72%) scored 1, 207 (7.24%) scored 2, 1226 (42.90%) scored 3, 737 (25.79%) scored 4, and 496 (17.35%) scored 5, with an average score of 3.4 (Figure 1).The data showed that students' satisfaction with the online course was generally at a medium level, and the data results were normal distribution.

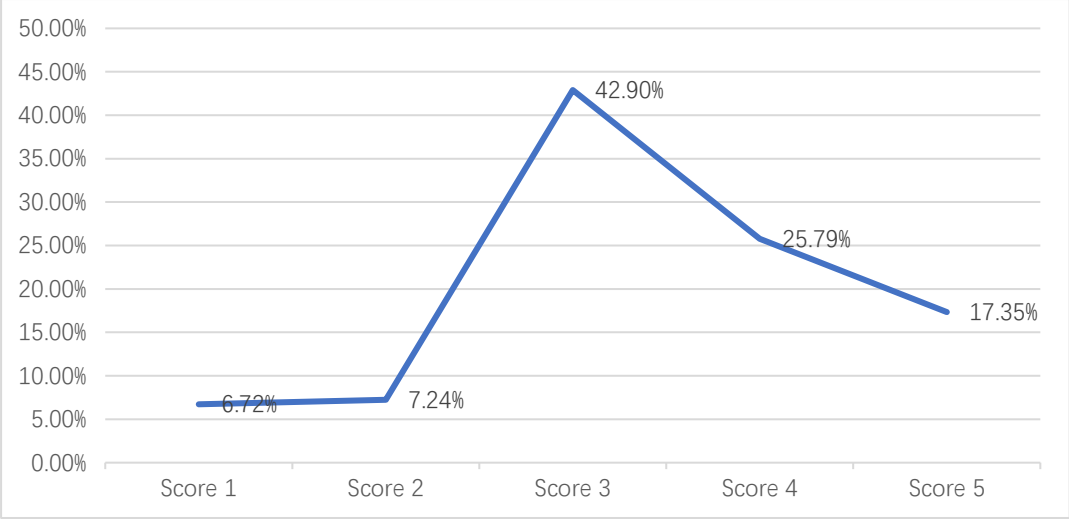

Figure 1. Satisfaction with your learning efficiency of the online courses

The data signifies that students' satisfaction with the efficiency of online courses is generally at a medium level. A normal distribution indicates that the majority of students have average satisfaction levels, with fewer students expressing extreme satisfaction or dissatisfaction. This may suggest that online courses are somewhat effective in delivering content, but there is still room for improvement to enhance student satisfaction and learning outcomes.

The Significant Factors Affecting the Learning Efficiency of Online Courses

Through the analysis of the questionnaire survey, it is found that the most significant factor affecting the learning efficiency of online courses is the degree of students' self-discipline. When selecting "the most critical factor affecting online courses' learning efficiency", nearly 60% of respondents choose "the degree of self-discipline and mood state", followed by teachers, online platforms and other factors (Figure 2). Among the "the reasons for the decline in the efficiency of online courses", nearly 65% of students chose "lack of self-discipline" (Figure 3).

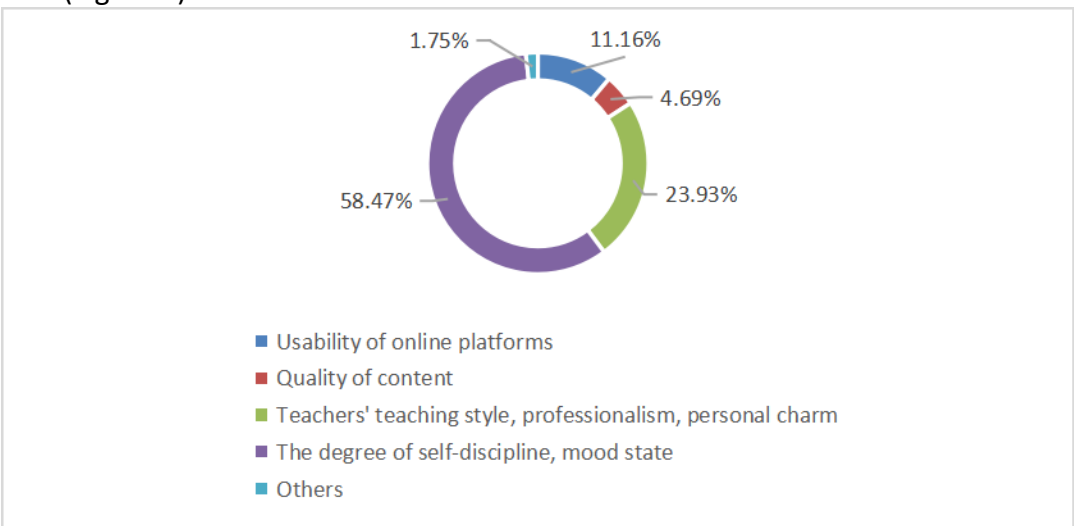

Figure 2. What is the most critical factor affecting online courses' learning efficiency?

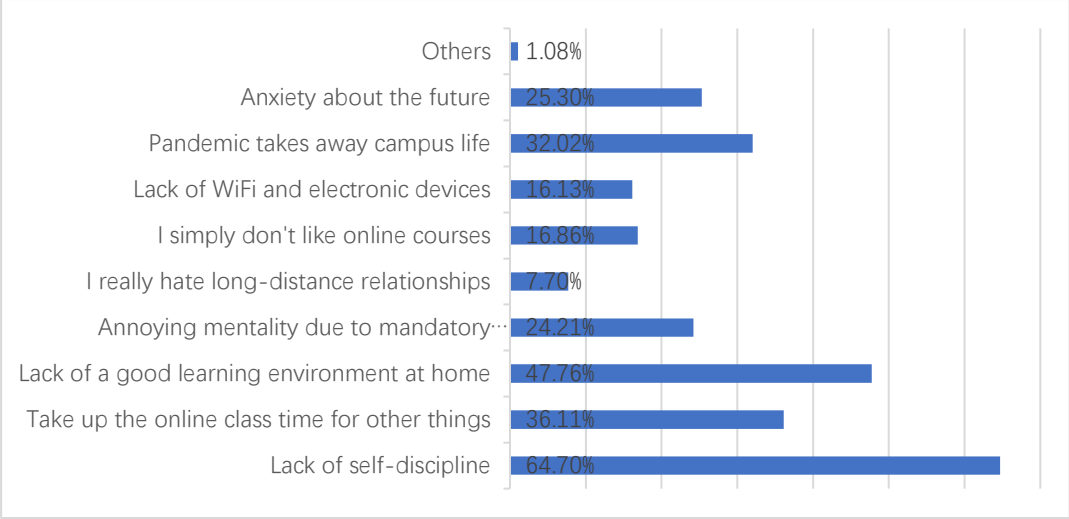

Figure 3. What do you think are the reasons for the decline in the efficiency of online courses?

"Teachers' teaching style, professionalism and personal charm" are the second most important factors that students pay attention to (Figure 2). According to the questionnaire, only 7.84% of respondents believe that teachers do not influence the learning efficiency of online courses (Figure 4).

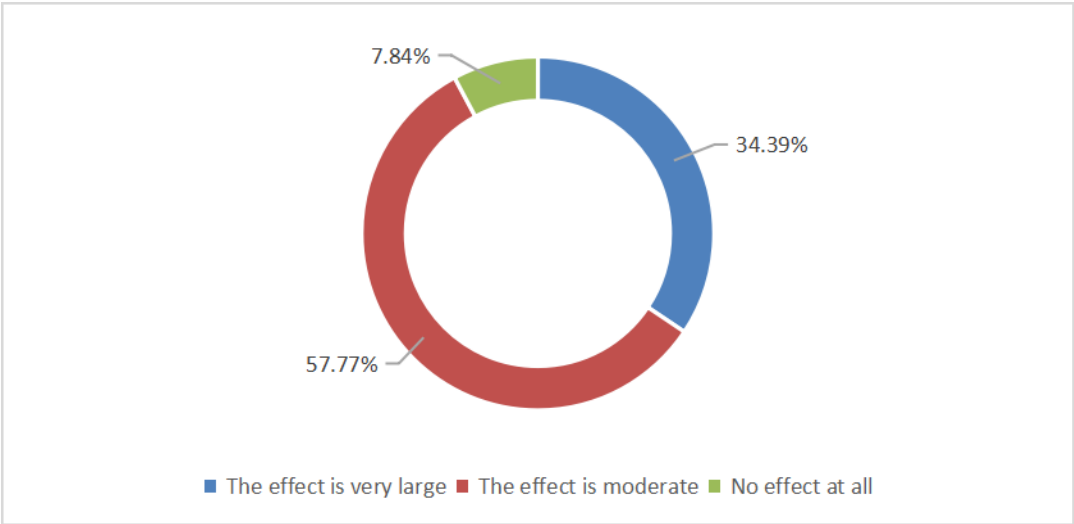

Figure 4. What do you think is the effect of different teachers on your online learning efficiency?

Both self-discipline and the quality of teaching are crucial factors influencing the efficiency of online courses (Kebritchi et al., 2017). The data highlights the critical role of students' self-discipline in determining the efficiency of online courses. It suggests that students' ability to maintain focus, manage their time, and regulate their emotions significantly impacts their learning outcomes in online environments. The second most important factor is the teachers' teaching style, professionalism, and personal charm, indicating that the way teachers deliver content and engage with students also plays a significant role in online learning efficiency.

Views on the Hybrid Education

Although only 27.19% of the respondents chose to "understand" the hybrid education (Figure 5) after the researchers briefly introduced the definition of the hybrid education, 62% of the respondents thought that the hybrid education was better, 12.28% of the respondents thought that all online teaching was better, and 25.09% of the students preferred all offline teaching (Figure 6).

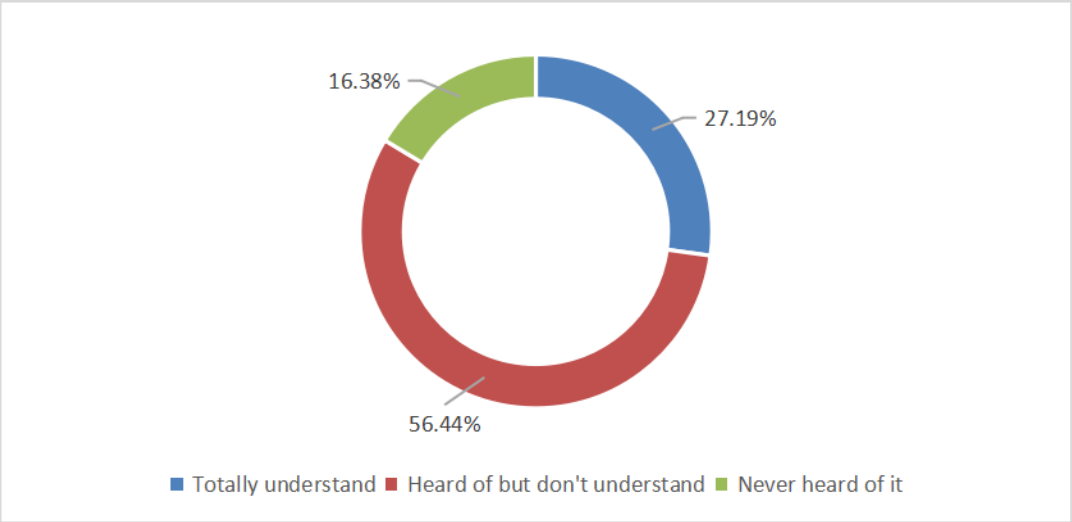

Figure 5. Do you know what a " hybrid education " is?

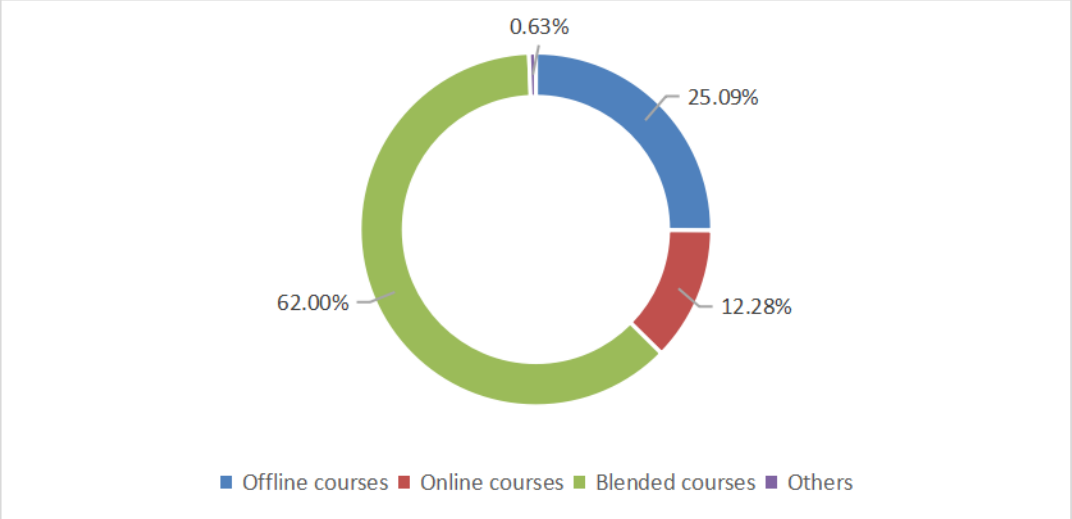

Figure 6. Which one do you think is better, hybrid education (blended courses) or offline/online courses?

68.23% of the respondents believe that the biggest advantage of hybrid education is rich digital resources and interesting. In addition, more than half of the respondents said more choices and freedom from time and space are also advantages of hybrid education. Nearly 40% of the respondents cited the ability to choose a course with a famous teacher and the ability to improve learning efficiency as two advantages. (Figure 7).

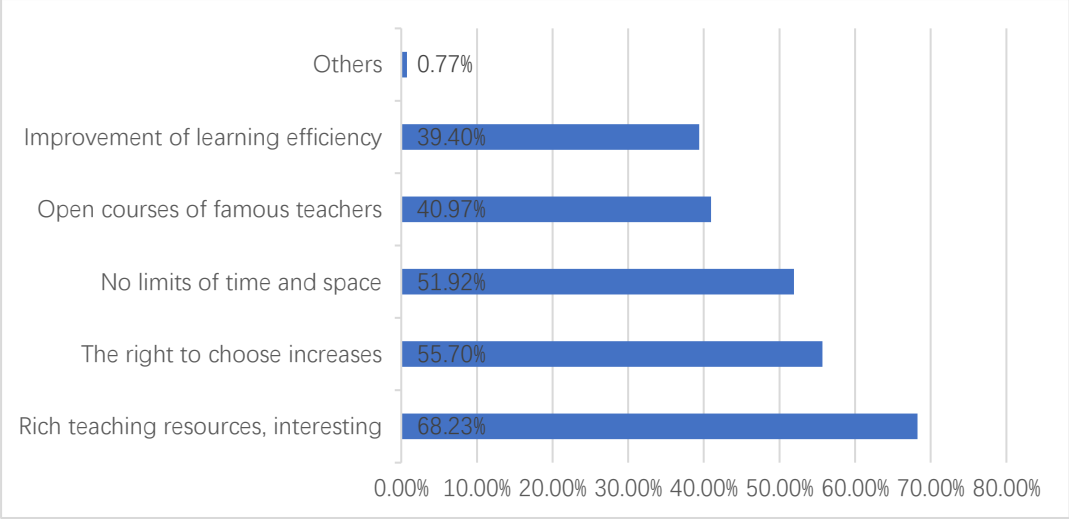

Figure 7. What do you think are the advantages of hybrid education?

More than half of the respondents think that the lack of smooth communication between teachers and students is the biggest disadvantage of the hybrid education, and nearly 47% think that the hybrid education has a certain degree of technical threshold and lack of supervision. In addition, 31.35% of the respondents think that the strong practical major is more suitable for offline education than the hybrid education. (Figure 8).

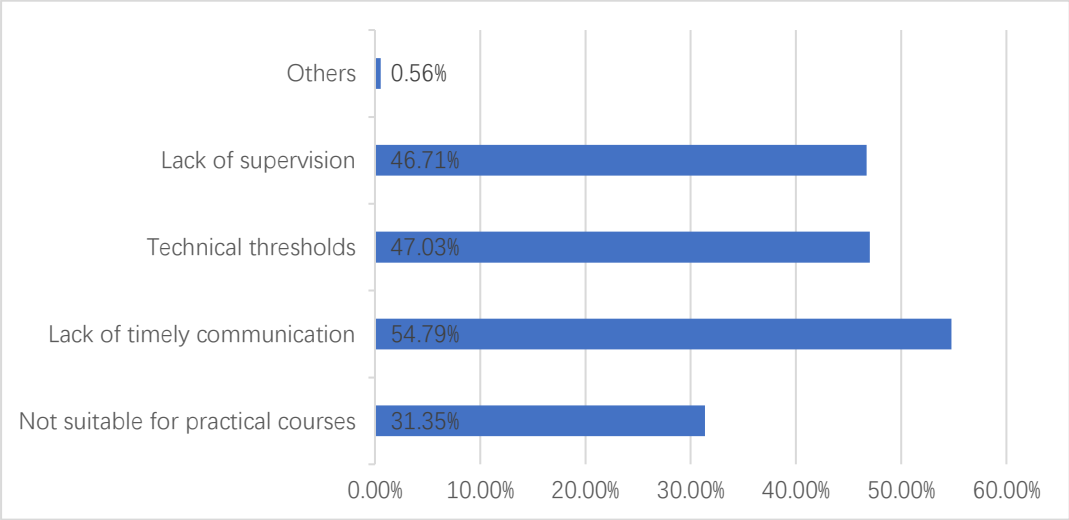

Figure 8. What do you think are the disadvantages of hybrid education?

62.00% of the respondents believed that the hybrid education would become the mainstream under the epidemic situation, and 52.94% of the respondents believed that the optimization of online courses was conducive to the development of hybrid education. On the other hand, after the domestic epidemic is improved, offline classes will still be the mainstream, and the proportion of respondents who think hybrid education has no advantages and those who oppose the hybrid education are significantly less than those who support the hybrid education, accounting for 32.89% and 10.32% respectively (Figure 9).

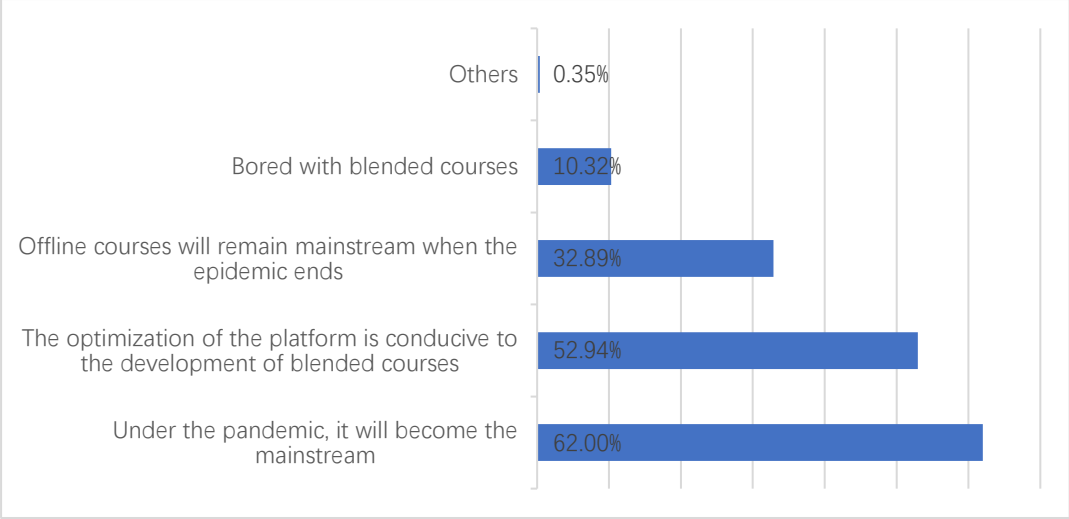

Figure 9. Views on the prospect of hybrid education(blended courses)

According to Alammary et al. (2014), hybrid education offers both advantages and disadvantages, and that effective design and implementation are critical for maximizing its potential. The data demonstrates that many respondents believe hybrid education offers significant advantages, such as rich digital resources, increased flexibility, and access to renowned teachers. However, there are also perceived disadvantages, including communication barriers between teachers and students, technical challenges, and the unsuitability of hybrid education for practical majors. While the majority of respondents believe that hybrid education will become the mainstream during the pandemic, many still expect offline classes to resume as the predominant mode of instruction once the situation improves.

Unexpected Findings in Open Q&A

Different from the quantitative research based on the results of the options, many factors affecting the learning efficiency of online courses that had not been considered before the study were obtained from the open Q&A.

For example, in the open question and answer session, some respondents mentioned reasons for not wanting to take courses online, such as "longing for regular university life", "missing classmates and teachers", and "tired of social isolation caused by the epidemic and difficulty in meeting emotional needs of peers". The long-term closure of online classes at home has even led to the depression of some students. This suggests that the study, families and society should pay more attention to students' mental health problems.

Some respondents also mentioned the influence of the learning environment and family life pressure on the learning efficiency of online courses. Some respondents point out that the lack of an independent, quiet, perfect and comfortable study environment at home, conflicts with family members and a shortage of living expenses are many distractions that make it difficult for them to focus on their studies.

In addition, physiological factors are also important factors affecting the efficiency of online courses. Several respondents have pointed out that long-term online courses increase screen time, resulting in dry eyes and blurred vision. This suggests that students should increase outdoor sports and pay attention to their health.

Findings

Students' self-discipline emerges as a vital determinant of online learning efficiency

The statistical outcomes of the questionnaire survey highlight that low self-discipline among students constitutes the most critical factor impacting the efficiency of online courses (Gaytan, 2013). Concurrently, researchers discovered through open question and answer feedback that some respondents perceive both advantages and disadvantages in the online course model. However, online course learning efficiency primarily hinges on students' self-discipline, posing significant challenges and requirements for this attribute (Waschull, 2005). Students' initiative plays a substantial role in influencing the efficacy of online courses.

Teachers urgently require the adoption of more scientifically grounded teaching methodologies for online courses

Historically, the teaching mode centered on face-to-face interaction between educators and students has dominated school education, and China's average education lacks sufficient training for teachers in utilizing online education methods (Zhou et al., 2020). The absence of scientifically-based methods and specialized skills in the online education mode leads to teachers replicating traditional education mode methodologies in the online education process, inevitably resulting in suboptimal online teaching outcomes (Yang, 2020).

For instance, offline face-to-face teaching often employs group discussions, relying on students and teachers communicating in the same physical space and time. Such discussions facilitate opinion exchange, spark creative thinking, foster teamwork, and build strong friendships, thereby enhancing classroom efficiency and creating a warm atmosphere (Yen et al., 2018). In a remote online class setting, if teachers continue to use group discussions and allocate substantial time for students to engage in free discussion during live broadcasts, these discussions might not be efficiently utilized due to the absence of screen supervision and students' lack of self-discipline. Furthermore, factors such as network latency and limited expressiveness may result in low communication efficiency between teachers and students, reduced student participation, and poor outcomes, ultimately diminishing online course efficiency. These findings suggest that teachers should design interactive communication links better suited to the distinct characteristics of online courses, such as non-presence and latency, to enhance online learning efficiency (Yang, 2020).

With the rapid development of the internet, numerous online course platforms have emerged, offering increasingly sophisticated and optimized features. Consequently, the decrease in learning efficiency due to online courses is no longer their primary challenge. On the contrary, the diverse selection of online course platforms, the inconsistency among various subjects and teaching platforms, and the complexity of switching between platforms and applications have exacerbated students' difficulties. In addition, the growing wealth and comprehensiveness of online course platform features present further challenges for teachers and students in fully utilizing the platform capabilities.

According to the survey, 69.56% and 53.43% of respondents' primary requirements for an online course platform are a "stable and smooth network" and a "simple interface with uncomplicated operations," respectively. This indicates that, rather than "metaverse"-type interactive features or dazzling animation effects, online course platforms should prioritize addressing users' core needs, expanding simultaneous online capacity, ensuring smooth live broadcasting, and developing a streamlined and efficient online learning platform.

The Evolution of Hybrid Education

In the third year of COVID-19's progression, teachers and students have amassed substantial online learning experience, leading to high acceptance of online courses and strong support for hybrid education. Although hybrid education possesses inherent flaws and contradictions, its overall developmental trajectory appears promising (Ali & Doan, 2006). Numerous scholars worldwide have conducted research on hybrid education, but further examination of the feasibility of implementing hybrid education in highly practical specialties is necessary(Nilson & Goodson, 2021).

In the questionnaire, students specializing in art and sports, which emphasize practical skills, accounted for 26.24% and 11.09% of respondents, respectively, comprising over one-third of the total participants. Among the 969 open question and answer responses, students in highly practical majors expressed diverse demands. For example, dance students mentioned that they "lack sufficient space at home for dancing," "disturb downstairs neighbors while dancing at home," "struggle to learn dance movements by simply watching videos," and "rely on self-exploration, resulting in low learning efficiency." Instrumental music majors cited the "absence of professional equipment" and "inconvenience for teachers to instruct," while students in physical education majors claimed that they "lack space for practice and struggle to learn movements from online classes."

These survey results demonstrate that single online teaching methods cannot fulfill the learning needs of students in some practical majors, nor can they guarantee optimal learning efficiency and quality. Highly practical majors inherently possess limitations, as not all teaching content is suited for online platform instruction (Adarkwah, 2021). Yang (2020) points out that certain aspects of primary education, such as music and drama, are difficult to translate effectively to online platforms due to the unique atmosphere and experiences they provide in traditional settings.

Exploration of teaching modes for highly practical majors may depend on advancements in technology (Gong, 2021). Artificial intelligence and virtual imaging technology can make online dance instruction and sports movements more realistic and immersive, while the application of 5G technology can mitigate network latency issues. However, it is evident that these expectations will not materialize in the short term, and their implementation may be costly, potentially exacerbating the digital divide and further separating students with varying access to resources. To address the needs of music, sports, and arts majors, as well as promote cultural development and healthy living, government and community initiatives should provide more specialized classrooms, sports facilities, and hardware support for hybrid education.

In light of the current hybrid education model, which combines "online course video demonstrations" and "students' self-practice after class," it remains uncertain whether this approach can ensure or even enhance learning efficiency for students in highly practical majors, such as music, sports, and arts. Further research is needed to explore alternative educational models tailored to these specialized areas.

Conclusion

The results of this study underscore the importance of addressing the underlying challenges affecting online learning efficiency, particularly as the COVID-19 pandemic persists. As humanity adapts to the possibility of recurrent outbreaks, it is vital to refine our approach to online education by establishing robust teaching mechanisms, innovating pedagogical methodologies, and fostering instructors with specialized online teaching expertise.

Furthermore, prioritizing students' psychological well-being and actively seeking synergies between online and offline teaching modalities will enable the continuous exploration and development of hybrid education models, ensuring resilience and adaptability in the face of unprecedented challenges. By highlighting these issues and potential solutions, this study contributes to the ongoing discourse on online learning and hybrid education, providing valuable insights for educators, policymakers, and institutions seeking to enhance the quality and efficacy of online courses in higher education.

Acknowledgements
We acknowledge and appreciate the Journal Support Fund, UiTM's commitment to advancing knowledge and fostering academic excellence in higher education.

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