# Exploring University Students' Self-Directed Learning in Online Learning

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## ABSTRACT

This qualitative case study aims to understand the situation of university students' SDL and identify the factors that help university students solve the problem of SDL in online learning. It involved seven participants who were selected according to the inclusion criteria. Using thematic analysis of the interview data, the researchers found that the university students' perceptions of the problems of SDL in online learning are: traditional teaching and learning limits SDL, lack of effective monitoring and evaluation of the SDL process, insufficient awareness of SDL, insufficient effective resources for SDL, methods of teaching SDL need to be improved, and inadequate online learning platform. Besides, reforming online teaching and learning models, building a mechanism for monitoring and evaluating SDL, strengthening university students' knowledge of SDL, improving online learning resources, improving methods of teaching SDL, and creating an online favorable atmosphere for university students are solutions to help university students solve the problem of SDL in online learning.

## KEYWORDS

COVID-19, Education, Learner, Learning, Lecturer, Online, Platform, Self-Directed Learning, Student, University

## INTRODUCTION

Technology in the age of globalization is growing very fast. All sectors, including education, must integrate with technology to generate competitive human resources. At the same time, the development of information and communication technology (ICT) in education has shifted from offline face-to-face classroom instruction to online learning, with unlimited access at any time and from any location. With the impact of globalization, education will be more open and two-way, diversified, multidisciplinary, and related to competitive productivity (Serevina, 2018). Self-directed learning (SDL) is a variety of learning processes related to goal-directed, self-controlled learning behaviors (e.g., Fisher & King, 2010; Schmidt, 2000). Knowles (1975), a pioneer in the field, defined SDL as follows: without the help of others, a person can take the initiative to diagnose his own learning needs, set learning goals, determine human and material resources for learning, select and implement appropriate learning strategies, and the process of evaluating learning outcomes. SDL develops learner skills that correspond to challenges in the modern world, and some learning departs from traditional

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learning methods because it builds the capabilities required for continuous professional education (AbuAssi & Alkorashy, 2016).

However, it is noteworthy that there have been significant educational changes during the COVID-19 pandemic (Flores, 2020). Before other universities worldwide adopted online learning, Chinese universities were the first to discontinue all offline face-to-face learning (Jiang et al., 2021). During the three years of the COVID-19 pandemic, schools worldwide, including universities, were forced to address the restrictions provided by standardized programs, including full school closures and an immediate and complete transition to online learning (Adedoyin & Soykan, 2023). Online SDL has become the new normal for college and university students (Al Zahrani et al., 2021), which is defined as the education of Internet delivery, a necessary change to include in regions where online learning is underdeveloped (Akabayashi et al., 2023). Students must use SDL skills to meet immediate educational needs, as any other professional or general training type is impossible. Besides, lecturers must quickly develop online teaching skills (Chen et al., 2020), and students need to adapt to SDL (Chen et al., 2022; Gerard et al., 2022; Safa & Wicaksono, 2022). In addition to adaptation, university students still have many defects and problems in online learning (Teng & Li, 2020).

Exploring university students' SDL in online learning is pivotal because it empowers students with autonomy, adaptability, and lifelong skills, fostering flexibility in managing diverse commitments. SDL fosters resilience, critical thinking, problem-solving skills, and academic accomplishments, preparing students for obstacles they will face in the real world. Setting and achieving personal goals improves motivation and academic achievement. Moreover, it fosters international cooperation, technological competence, and an attitude of perpetual improvement, highlighting its critical role in molding a well-rounded and future-ready student (Hou, 2023). In the constantly changing field of higher education, it is imperative to comprehend and maximize SDL in virtual environments. In this context, this study aims to adopt a qualitative case study design with one-to-one interview and focus group discussion techniques to investigate university students' SDL, which enabled them to overcome learning difficulties during online learning to fulfill their learning goals.

## PURPOSE

Based on the background and development of online learning, this study aims to understand the present situation of university students' SDL to explore their perceptions of the problems of SDL in online learning. This study also tries to identify the factors to help university students solve the problem of SDL in online learning, and then implement targeted improvement countermeasures to help their SDL practice. This study hopes to ensure that university students can better play to SDL's initiative and develop good SDL habits.

## RESEARCH QUESTIONS

There are two research questions, as follows:

1. What are the university students' perceptions of the problems of self-directed learning in online learning?
2. What are the factors to help university students solve the problem of self-directed learning in online learning?

## LITERATURE REVIEW

In this expansive landscape of SDL within higher education and online learning, the insights gleaned from numerous perspectives contribute to a rich tapestry of understanding. The literature

review will comprehensively examine university students' SDL, exploring how researchers have approached and dissected this phenomenon. By synthesizing diverse perspectives, the review aims to provide a nuanced and holistic perspective on the concept and characteristics of SDL. Furthermore, it will extend its purview to encompass the intricacies of online learning, unraveling the unique dynamics of virtual education. The review will expound upon the conceptual framework of online learning, delineating its advantages and challenges. This thorough exploration is geared towards establishing a comprehensive backdrop for the present study, setting the stage for an in-depth investigation into the SDL experiences of university students in the dynamic context of higher education and online learning.

## Self-Directed Learning

### The Concept of SDL

SDL is an essential dimension (Kohan & Arabshahi, 2017). It is a process in which learners actively build their learning experiences by diagnosing their learning needs, setting goals, and identifying and effectively using educational resources that meet their specific learning needs (Knowles, 1975). According to Gibbons (2002), SDL is a skill where people can decide for themselves, choose goals to achieve, plan strategies, solve problems, manage themselves, and evaluate their thinking and performance. The SDL will enhance individual knowledge, expertise, and achievement. According to Othman (2014), SDL is one of the educational methods by which learners achieve their goals by interacting with educational materials, learning according to their abilities, preparations, and special abilities, and receiving the lowest level of lecturer guidance. Schmidt (2000) believed that problem-solving is important in SDL. He also emphasized the role of teachers in organizing students' cognitive activities, while he emphasized the motivation for the need for students to guide their learning. SDL is a promising approach to lifelong learning because it allows people to identify resources, formulate their learning objectives, implement their learning strategy, and analyze their learning outcomes (Chakkaravarthy et al., 2020). Learning motivation is the primary factor that propels SDL and is crucial in determining SDL quality (Wong et al., 2021). Encouraging learners to enhance their academic performance is essential, as it impacts learning outcomes.

### The Characteristics of SDL

Ruttencutter (2018) believed that SDL has the following characteristics. First, one must be responsible for learning, find out the causes and factors of the problems arising from learning activities, and face the difficulties arising from the learning process. Second, one wants to be confident and believe that hard work will bring rewards. Third, one needs to have a clear learning goal and choose and apply appropriate learning strategies according to the learning task to regulate learning activities. Fourth, one needs to make a reasonable learning plan and allocate time. The student must have clear learning goals and can choose and use appropriate learning strategies to regulate their learning activities according to the learning tasks. They can make reasonable learning plans and allocate their time. According to Pintrich (2000), SDL has three characteristics. Firstly, learners can respond positively to information others provide. Secondly, they face their shortcomings and actively regulate the learning process. Thirdly, they evaluate their learning results according to the learning objectives and certain criteria and can adjust based on feedback information. Individual learners have an explicit knowledge and understanding of learning activities. Many different and intricate elements contribute to SDL. Prior research mainly examined contextual and unique characteristics, including age, gender, personal confidence, potential career recognition, family income, learning resources, learning motivation, learning aim, and learning approach (Barton et al., 2019; Samarasooriya et al., 2019). Meanwhile, significant interactions exist between psychological emotions such as stress, despair, and anxiety also influence SDL (Chang et al., 2021).

## Online Learning

### The Concept of Online Learning

Online learning has led to technology-enhanced teaching and learning, which has become a common feature of education worldwide (Flavin, 2016). At the end of the 20th century, Hiltz (1995) first proposed the concept of online learning. He believed that online learning refers to placing curriculum information and resources in a virtual learning space formed by a network that allows students to achieve offline face-to-face learning results. Online learning has become a normal and essential learning method for university students, providing rich learning resources and more learning opportunities for learners, and the learning methods have become more ubiquitous and personalized. Online learning is a complex learning process that has higher requirements for learners' consciousness, psychological characteristics, and behavioral motivation (Huang et al., 2024). Learners need to self-drive, self-manage, and self-regulate the learning process. Online learning can be defined in several ways depending on the context and environment in which it occurs. Researchers saw online learning as a teaching method with multiple integrated technologies. At the same time, some suggested that it is an alternative to distance education and may be an effective way of rapid communication (Bertea, 2009). He (2002) believed that online learning refers to the use of modern information technology means of learning and teaching activities through the Internet, which changes the role of teachers and the relationship between teachers and students in traditional teaching and fundamentally reforms the conventional teaching structure and the nature of education to achieve the purpose of cultivating talents. Compared with traditional offline learning, teachers and students are separated in time and space during online learning. At the same time, online learning has autonomy, and learners can grasp the learning progress by themselves, which requires learners to have a specific self-monitoring ability.

### Advantages and Challenges of Online Learning

Like any method of teaching and learning, online learning has advantages and challenges. Not to be overlooked are the benefits of online learning, which include greater convenience and access to information at any time or place (Gilbert, 2015). Breaking through time and space restrictions can meet students' learning needs anytime and anywhere and promote the sharing of high-quality educational resources (Dong & Guo, 2021). The demand for online courses is derived from a push "to provide quality education to all students, regardless of location and time"(Chaney, 2001). Many instructors and students commented on their ability to focus more of their attention on the content of the course and less on issues such as parking, traffic, and other problems that may arise when attending a traditional class environment (Thomson, 2010). However, online learning also has challenges, including that lecturers need to spend more time preparing for online courses (Kaden, 2020). They are required to create an engaging atmosphere for students to develop and exploit distance learning materials in a limited amount of time (Francom et al., 2021). There is a lack of face-to-face communication in online learning, and lecturers and students need to communicate in real-time through the network, which puts higher requirements on teachers' and students' teaching and learning abilities (Dong & Guo, 2021).

## METHODOLOGY

### Research Design

This study adopts a qualitative case study design to explore the educational landscape surrounding SDL in online education. The rationale for selecting this methodology lies in the intricate nature of SDL and the absence of a definitive framework for its constituent structures and variables, as underscored by Freebody (2002) and Voss (2010). This study employs one-to-one interviews and focus group discussions to delve into university students' perceptions of the problems and the factors to help university students solve the problem of self-directed learning in online learning, utilizing a case study as a fitting approach. This multi-faceted approach aims to identify factors influencing SDL,

offering a nuanced understanding of the complex interplay of elements affecting students' experiences. The overarching goal is to pinpoint challenges and propose practical strategies for investigating and improving university students' SDL practices, ultimately enhancing their ability to overcome learning difficulties and achieve academic goals in online education.

This study seeks to unravel the current state of university students' SDL in two main phases, grounded in the historical context and developmental trajectory of online learning. Firstly, by exploring their perceptions of SDL problems, the study aims to identify the key challenges students face in taking control of their learning in an online environment. This exploration sets the stage for the second phase, which involves implementing targeted improvement measures. These measures are designed to create an environment conducive to proactive SDL initiatives, fostering positive SDL habits among university students. In essence, this comprehensive research approach not only sheds light on the current state of SDL in online education but also endeavors to contribute meaningful insights and practical strategies that empower students to navigate the complexities of online learning and foster a culture of proactive SDL.

## Participants

Researchers posted a call for the attendance of one-to-one interviews and focus group discussions in a social media group of graduate students in China with sample selection criteria. Seven graduate students applied, and all of them met the criteria. They were willing to participate in this study and had a deep online learning experience. The criteria for choosing the participants are as follows. First, participants must be students who have already graduated from a university less than three years ago. Because the popularity of online learning began after the COVID-19 pandemic (Almomani et al., 2021), students who have graduated more than three years ago may not have been involved in online learning. Second, participants had no major, gender, professional, or geographic restrictions. Third, participants must have been deeply involved in online learning during their university lives.

The participants were named X, Y, W, P, T, H, and S, and their names were hidden to ensure their anonymity. Interviews were deemed adequate when no new information was obtained to contribute to understanding this phenomenon. This means that the study has reached a saturation point and that the additional interviews will not provide essential insights into the study (Creswell, 2007). The researchers stopped interviewing new participants once no new code was identified from the data collection through constant comparative analysis. This indicates that this study has reached a saturation point and has redundancy in response. Merriam (2009) emphasized that once the data is saturated, it reflects the adequacy of the study. Although there are no set guidelines for sample size in qualitative studies, estimating the sample size in advance is advised to help with budget planning and early research design evaluation (Patton, 2015). Yin (2009) advocated combining no more than four or five case studies in a single study for case study research. Therefore, this study reached saturation when interviewing the seventh participant. All informed consent forms granted the participants' permission before the interview began. This study placed the privacy and safety of participants as a top priority, and it strictly followed ethical approval. Participation in this study was entirely voluntary; they received no monetary incentives and could have the right to stop participating at any time without giving a reason. All participant informed consent forms, personal data, and recorded video interviews were stored on the researchers' password-protected computer, and only the researchers had direct access to this data.

## Data Collection

This study uses one-to-one interview and focus group discussion techniques to collect data. Since the participants came from different places and needed to work on weekdays, all virtual interviews and focus group discussions were recorded using the Google Meeting application with approval by participants. First, this qualitative research used semi-structured interviews involving one-to-one, open-ended questions. The semi-structured approach allows the participants to share their views on

a particular topic. The interview covered RQ 1 and RQ 2. Each interview lasted approximately 50 minutes and included video recordings following a semi-structured interview protocol. Second, this qualitative research used focus group discussion involving 7 participants as a group, and each focus group discussion lasted approximately 80 minutes with video recordings and a focus group discussion protocol. The focus group discussion also covered RQ 1 and RQ 2.

## Data Analysis

This study employed a qualitative thematic analysis approach. Thematic analysis is a very flexible approach, a considerable advantage given the diversity of learning and teaching endeavors (Maguire & Delahunt, 2017). The researchers transcribed and analyzed data from the beginning of the first one-to-one semi-structured interview simultaneously with data collection using the tool NVivo. The goal of thematic analysis is to identify and apply those themes to address the research or discuss an issue. This is more than simply summarizing the data; an excellent thematic analysis interprets and understands it (Clarke & Braun, 2013). Therefore, this study identified themes from the transcriptions to discover university students' perceptions and the factors influencing their SDL in online learning.

## Trustworthiness

First of all, all interview protocols have been reviewed by two experienced researchers in this field. Second, pilot testing was done before the actual interview began. Third, all transcriptions were checked by the participants. The study's results combined interactions between the researcher and the participants to ensure accurate interview transcriptions. Fourth, this study adopted multiple data sources triangulation with different participants of university students from various universities. Besides, this study used multi-method triangulation by one-to-one interviews and focus group discussions. Lastly, this study strictly followed the operational guidelines and protocols.

## RESULTS

Data analysis revealed six themes of RQ1 concerning the university students' perceptions of SDL in online learning. Data analysis also revealed six themes of RQ2 concerning the factors influencing university students' SDL in online learning. The research findings are presented as follows (refer to Table 1).

## RQ1

For RQ1, what are the university students' perceptions of the problems of SDL in online learning? All the themes are presented in Figure 1.

### Traditional Teaching and Learning Limits SDL

In the traditional face-to-face offline learning and teaching mode, universities carry out educational teaching activities; most lecturers first tell the relevant principles to the students and then combine them with the students' teaching content to ask them to think and analyze. They will also guide the students to practical operation if there is a practical operation. Although this teaching mode can also invoke a specific teaching effect, the students are used to the lecturers' guidance and leadership, and this is insufficient for the students to cultivate SDL. Therefore, lecturers' narration and guidance are relatively weakened in the online learning environment, so the development of student's SDL ability will be even more affected. *"Under offline learning, I have been used to the guidance and leadership of lecturers and seldom study and think independently. I was at a loss when the lecturer had less narration and guidance in online learning." (X)*

**Table 1. Themes of this study**

| Research Question | Themes |
|---|---|
| RQ1 | Traditional teaching and learning limits SDL |
| | Lack of effective monitoring and evaluation of the SDL process |
| | Insufficient awareness of SDL |
| | Insufficient effective resources for SDL |
| | Methods of teaching SDL need to be improved |
| | Inadequate online learning platform |
| RQ2 | Reform online teaching and learning models |
| | Build a mechanism for monitoring and evaluating SDL |
| | Strengthen university students' knowledge of SDL |
| | Improve online learning resources |
| | Improve methods of teaching SDL |
| | Create an online favorable atmosphere of SDL for university students |

**Figure 1. Themes of QR1**
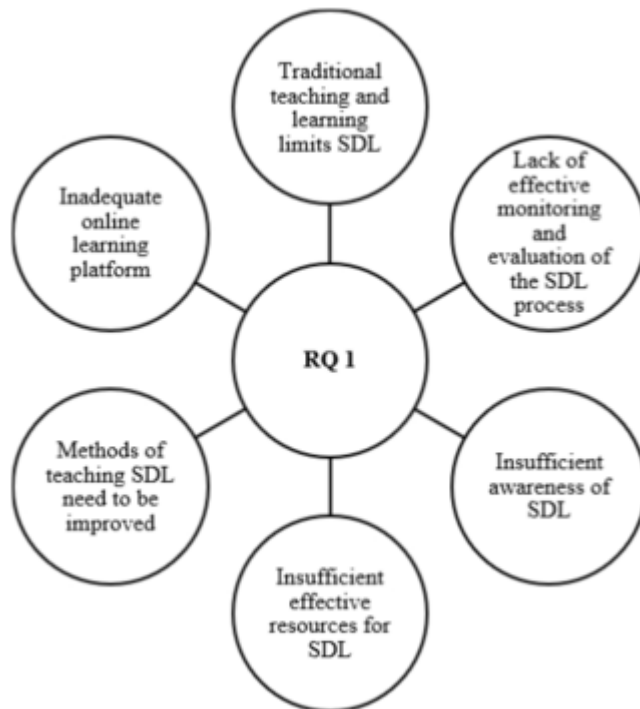
### Lack of Effective Monitoring and Evaluation of the SDL Process

Teaching and learning in the context of online learning allows university students to carry out SDL and give full play to their initiative. However, due to the limitation of time and space, the lecturer's role of classroom guidance and supervision cannot be effectively realized. As a result, students' SDL may sometimes deviate from classroom teaching due to the lack of effective supervision and guidance. Some students cannot recognize information and have low self-discipline. Therefore, they can not focus on their studies. In addition, due to the lack of corresponding supervision and evaluation mechanisms in online learning, students can not get timely feedback on the learning effect. Under such circumstances, SDL is prone to problems not conducive to understanding and grasping teaching knowledge. *"In the process of online learning, the lecturer cannot supervise what we are doing, and we have very few opportunities to ask questions and get feedback, which affects the performance of our SDL." (Y)*

### Insufficient Awareness of SDL

For a long time, because of the influence of the examination-oriented education system, university students have been mostly passive in the learning process to accept the knowledge taught by lecturers and then use rote memorization to obtain specific results. This prompts many students to have insufficient awareness of SDL, inadequate attitude toward SDL, and insufficient motivation and ability to learn or self-direct. Especially in the case of online learning, the insufficiency of students' sense of autonomy is even more apparent. Even if lecturers arrange SDL tasks for students, students do not know where to start, and their attitude towards SDL is not satisfactory. In addition, although some students have a certain sense of SDL, they lack purpose and planning in the learning process, so the whole SDL efficiency will naturally be lower. *"The lecturers told us what to learn and how to learn in offline learning. But online learning is different. I don't know where to start and have no learning goals or plans." (W)*

### Insufficient Effective Resources for SDL

Online learning for students to learn self-directly provides richer learning resources, to a large extent, expanding the SDL channels for university students. However, online learning also has more apparent disadvantages. On the one hand, the quality of resources on the Internet varies. Some false information may also be mixed in, which will directly affect students' access to correct information, affecting the effect of SDL for students, which has specific requirements for students' information recognition ability. However, as far as the actual situation is concerned, most university students do not have enough information recognition ability and cannot correctly identify helpful information. On the other hand, as the quality education environment continues to deepen, the knowledge system of education and teaching has become more and more complex. In this case, just a simple Internet search is far from enough, which requires more time and energy for students, reducing students' motivation for independent learning. *"The Internet resources are so informative and accessible that copy and paste saves me a lot of thinking time, and I never think about the correctness of that information. " (T)* Third, the entertainment content network is diversified, and many students are addicted to it, constantly compressing the time of SDL; learning autonomy and enthusiasm are also significantly reduced. *"I often play games over the Internet while taking an online course because the lecturer can't notice." (P)*

### Methods of Teaching SDL Need to be Improved

SDL is a choice of diversified learning methods from multiple perspectives based on university students' complete understanding of their situation. Therefore, cultivating students' SDL ability requires the cooperation of various departments within the university to ensure that students have enough time and energy to accomplish their learning goals and improve their abilities. Some

universities lack infrastructure and learning resources in online learning for students and lecturers to discuss together. The university libraries have no specialized books to provide students with theoretical knowledge about SDL ability. University students also lack training and courses to improve their SDL ability. *"In my university, as methods of teaching SDL need to be improved by strengthening the internal cooperation, expand the library's collection of specialized books on SDL, and provide training programs and courses specifically designed to improve students' SDL competence."*

### Inadequate Online Learning Platform

Since the widespread implementation of online learning, in the face of the steep growth in the frequency of use by the user population, online teaching and learning platforms have frequently experienced software lag, technical difficulties, and other phenomena. This caused online learning to be unable to be carried out smoothly, affecting the teaching experience of lecturers and students and making the negative emotions of students' learning stand out constantly. *"The constant software lag, unexpected exits, and other disruptions on the learning platforms have significantly hindered the smooth flow of online education. Witnessing these challenges is disheartening, making the overall learning experience less than ideal. Personally, dealing with these issues has heightened negative emotions during my learning journey."(H)* Secondly, online resources are uneven, and online courses and resources are diverse. In online learning, university students are the main teaching body; identifying high-quality course resources for their learning outcomes is particularly important. Many students do not have an in-depth understanding of online course learning, and their ability to recognize quality course resources is not strong. This leads to a lack of learning relevance for some students, who are lost in many resources and unable to learn efficiently, which is not conducive to enhancing their SDL ability. *"Online courses and materials vary greatly; unfortunately, like many students, I lacked a comprehensive understanding of the structure of online platforms, which is like a maze. I can quickly feel lost in the rich resources, which affects my ability to learn efficiently and thus hinders the development of my SDL." (S)*

## RQ2

For RQ2, what are the factors to help university students solve the problem of SDL in online learning? All the themes are presented in Figure 2.

### Reform Online Teaching and Learning Models

Online teaching and learning can be based on the background of the Internet, so university students can push education teaching resources to reform the traditional offline teaching and learning mode. Before class, the lecturer effectively guides students to study directly and prepares and thinks about the content of the upcoming study in advance. In class, the lecturer can use multimedia technology to teach students abstract knowledge points, reducing the difficulty of understanding, attracting students' attention, and stimulating students' interest in learning. Strengthening the guidance for students' SDL strategies, can promote students' SDL ability to be improved. *"I hope lecturers can use multimedia technology to attract our attention, stimulate learning interest, and adopt effective strategies to promote our SDL ability."(X)* After class, the lecturer can guide students to carry out self-directed practical investigations or based on the network platform for cooperative interaction and communication, which can create a new platform for students to learn directly and have interactive contact, thus effectively revolutionizing education and teaching. Students can also strengthen their SDL ability in the process. *"I suggest that lecturers build a platform for us to learn and interact to improve our SDL ability in communication and interaction." (H)*

### Build a Mechanism for Monitoring and Evaluating SDL

Monitoring and evaluation are critical parts of SDL for university students in online learning. Effective monitoring and evaluation can better help university students understand their SDL. Lecturers can

**Figure 2. Themes of RQ2**
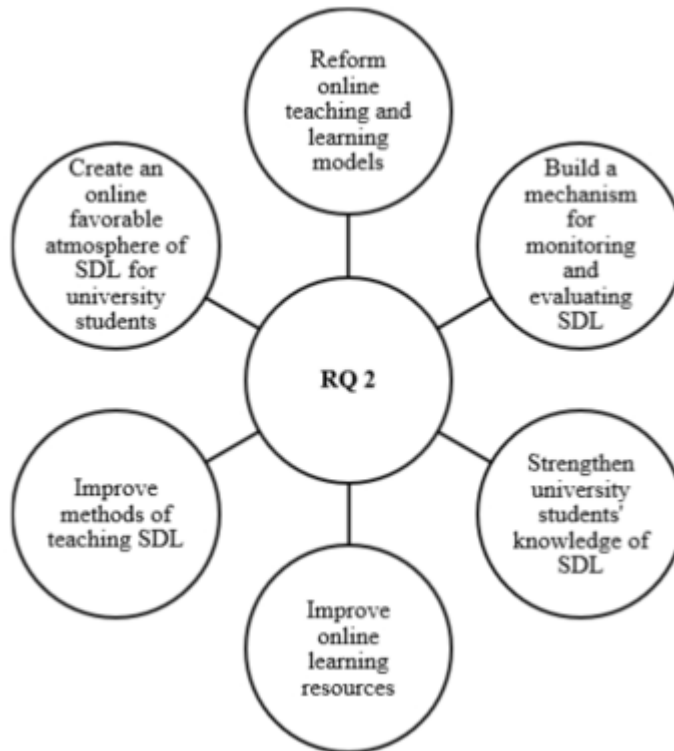


improve the feedback mechanism in online learning during the education period to further urge students to learn self-directly and to effectively implement the purpose of cultivating students' SDL ability. In this process, lecturers can use Internet technology to supervise and evaluate the whole process of SDL in online learning, such as observing students' online preparation, online homework, thematic discussions, and a series of situations, and then based on this, build a diversified evaluation system for students to analyze and evaluate the effect of SDL comprehensively. In addition, students also need to do an excellent job of self-direct reflection and summarization in the process of SDL to refine the teaching of the critical points. At the same time, they do an excellent job of interaction and communication with the lecturer to improve themselves further. *"I hope that my online learning can be carried out under the supervision and evaluation of the lecturer so that I can make direct self-reflection and summarize the SDL process to improve myself further."(W) "Internet technology can be used to establish a diversified evaluation system for students to comprehensively analyze and evaluate the effect of SDL, such as observing students' online preparation, online homework, thematic discussion, etc."(Y)*

### Strengthen University Students' Knowledge of SDL

University students realize the importance of SDL. Lecturers need to play their role as leaders and organizers so that university students are fully aware that professional courses are comprehensive and can not just be limited to the theoretical knowledge of the textbook to understand. Also, they need to improve their SDL ability, set up a sense of lifelong learning, and lay a good foundation for the student's future learning and development. Additionally, they need to improve the self-control ability of students. Guiding them to plan time rationally and pay attention to the combination of work

and rest so that students, according to their characteristics, establish their learning goals, develop a relevant learning plan, and urge themselves to complete the learning tasks in the specified time. In online learning, students should not spend too much time on entertainment. *"Improving SDL abilities is central, and lecturers are the organizers and leaders of online learning, and they should help us improve our SDL skills, such as helping us set our learning goals, developing our learning plans, and supervising and supervising our learning process." (P)*

### Improve Online Learning Resources

First, universities and lecturers help university students develop information recognition skills. They help them identify the quality of resources on the Internet, identify some false information, and obtain correct information. Secondly, it cultivates university students' ability to search for information on the Internet, how to accurately and quickly obtain the resources they need online, and save unnecessary time and energy to cultivate their ability of SDL. Thirdly, universities guide students to correctly deal with the relationship between learning and entertainment, not to be addicted to online games and entertainment, to improve their autonomy in learning and enhance their enthusiasm for learning. *"Universities and lecturers focus on improving our information recognition and Internet search skills and avoiding the interference of adverse effects such as online games to stimulate our enthusiasm for learning and develop our SDL." (T)*

### Improve Methods of Teaching SDL

First, the online education platform is the foundation of online SDL for university students. It mainly includes the construction of online education hardware facilities and software resources. The online education platform is a primary tool for university students' online SDL, including constructing online education hardware facilities and software resources. Therefore, universities should pay attention to the design of the online education platform. Based on fully understanding students' basic needs and preferences, carefully design the platform interface, basic navigation, information search, information pushing, and other functions to make the online education platform beautiful, simple, and easy to use to increase the attraction of the SDL for students. *"I think the online education platform fails to capture my attention because of the platform's single interface, inaccurate basic navigation, difficulty searching for information, and delayed information push." (S)* On the other hand, universities should focus on enriching online education resources, ensuring both the quantity and quality of online courses. In addition, a communication platform for online learning is built to facilitate communication and discussion between students and lecturers. Additionally, universities provide training or courses for university students to offer SDL competence and add book resources in this area in libraries and online platforms for students to read and study. *"We urgently need universities to provide us with training or courses for online learning and add relevant learning resources to libraries and online platforms to help us improve our SDL capabilities." (X)*

### Create an Online Favorable Atmosphere of SDL for University Students

The university builds a platform for lecturers and students to communicate with each other through online learning platforms. *"We need a platform where we can interact and communicate with peers and lecturers on time during online learning." (W)* Secondly, universities focus on developing students' SDL ability. Lecturers should establish their level, continually update their knowledge reserves, often communicate with other lecturers, carry out teaching and research meetings, participate in training, etc., to help create a favorable environment for students and contribute to enhancing their SDL ability. *"The period in which online learning has been carried out has also seen varying levels of online teaching by lecturers, who should be upgraded through communication, teaching and research conferences, and training." (H)* Thirdly, the university should promote SDL ability from the construction of the environment through celebrities' quotations, setting up student role models, and carefully evaluating

students' learning achievements. *"Celebrity quotes and student role models also create a favorable online atmosphere for SDL." (S)*

## DISCUSSION

This qualitative study found the results of the university students' perceptions of the problems of SDL in online learning and the factors that help university students solve the problem of SDL in online learning.

### RQ1

First, the result of traditional teaching and learning limits SDL, which aligns with Guo (2020). He also maintained that lecturers could timely understand students' learning effects according to their classroom performance to carry out targeted guidance in the formal face-to-face learning and teaching mode. However, in online learning, lecturers and students are across the screen, and lecturers cannot judge the students' mastery of the knowledge according to their status. Therefore, some students with poor self-study ability and who are not strict with themselves have negative emotions about learning, which affects their SDL. Second, the lack of effective monitoring and evaluation of the SDL process is in line with Reyes and Caballes (2021), who stated that if the learning environment allows for SDL, then the quality of teaching and learning can be improved, and sustainable intervention, preparation, monitoring, and implementation must be carefully considered and strategic platforms developed. Third, the result of insufficient SDL awareness is similar to Ročāne and Samuseviča's (2020) research. They found that SDL's structural process consists of interrelated components, such as understanding of knowledge application, motivation, goal setting, attitudes, etc. However, this study focuses on many university students with insufficient awareness of SDL, insufficient attitude toward SDL, and insufficient motivation and ability to learn self-directly. Especially in the case of online learning, the insufficiency of university students' sense of autonomy is even more apparent. Fourth, the result of insufficient effective resources for SDL is in line with Chen (2021), who maintained that university students' lack of information processing ability affects the cultivation and development of their SDL ability. Fifth, methods of teaching SDL need to be improved. Cultivating university students' SDL ability requires the cooperation of various departments within the university to ensure that university students have enough time and energy to accomplish their learning goals and improve their abilities. Last but not least, the result of inadequate online learning platforms aligns with the findings from the research of Ročāne and Samuseviča (2020) and Reyes and Caballes (2021). They maintain the importance of the network platform environment for students' SDL.

### RQ2

First, reform online teaching and learning models in line with Zhang's (2022) research. He maintained that university students' SDL ability requires a change to the traditional teaching mode and learning strategy, improving students' learning strategy application and the ability of teachers to gradually guide students to learn their own learning goals and plans, such as by training students' learning objectives and planning ability, and gradually expand to other learning objectives and the cultivation of planning ability, eventually improving students self-orientation ability. Second, build a mechanism for monitoring and evaluating SDL similar to the findings from Reyes and Caballes (2021). However, they focused on improving students' ability to monitor and master SDL in their learning environment. This study focused on the lecturers in the student SDL who were supervised and evaluated during the entire online learning process. Third, the result of strengthening university students' knowledge of SDL is in line with Zhang et al. (2020), who considered that enhancing students' awareness of SDL is one of the ways to improve their SDL ability. However, this study illustrates even further that improving the self-control ability of university students also improves their SDL ability. Fourth, improve online learning resources. This result aligns with Beckers et al. (2016), who maintained that successful

**Figure 3. Conceptual framework**
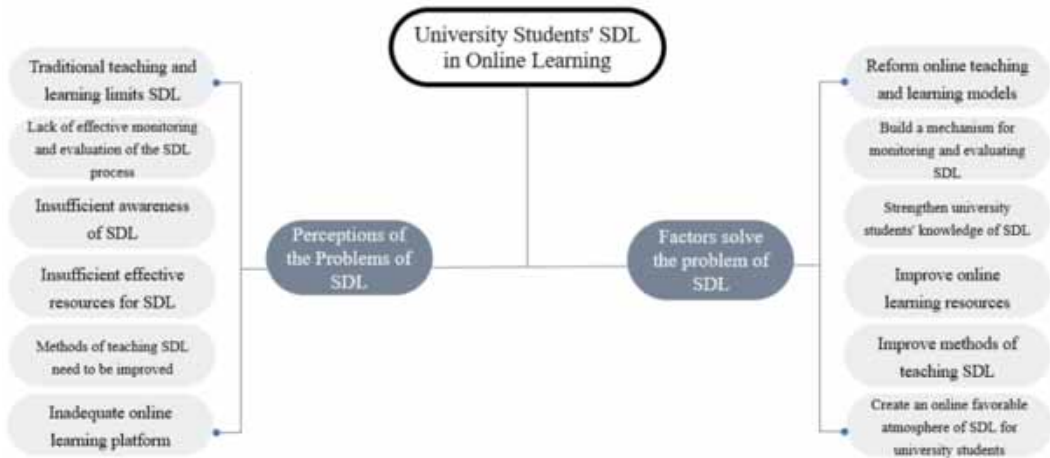


advancement of SDL skills will likely be achieved in teacher guidance to students. Fifth, the result of improved methods of teaching SDL is a new finding that universities should attach importance to the design of online education platforms. Based on fully understanding students' basic needs and preferences, they should carefully design the platform interface, basic navigation, information search, information push, and other functions to make online education platforms beautiful, simple, and easy to use and increase the attractiveness of SDL to students. Universities should also pay attention to enriching online education resources, ensure the quantity and quality of online courses, and provide training or courses for students to improve the ability of SDL. Lastly, creating an online favorable atmosphere of SDL for university students is similar to the results found by Tohidi et al., (2019), who found that conducting more effective planning to improve student SDL is a motivation and learning strategy to enhance effective SDL. However, this study focuses on lecturers who should constantly update their knowledge reserve, often communicate with other lecturers, conduct teaching and research meetings, and participate in training to create a suitable environment for students and improve their SDL ability. Additionally, they should provide relevant courses for students to cultivate their awareness of autonomous learning. Celebrity quotes establish students' role models, seriously evaluate students' academic performance, and improve SDL ability from environmental construction.

## CONCLUSION

This study was conducted to determine the university students' perceptions of the problems of SDL in online learning and the factors to help university students solve the problem of SDL in online learning. A conceptual framework (Figure 3) is presented for exploring university students' SDL in online learning, which is a structured model that outlines the key elements, relationships, and themes involved in the study.

Perceptions of the problems of SDL: This component focuses on understanding university students' perceptions of the problems of SDL in online learning. It identifies six major themes: traditional teaching and learning limits of SDL, lack of effective monitoring and evaluation of the SDL process, insufficient awareness of SDL, insufficient effective resources for SDL, methods of teaching SDL that need to be improved, and inadequate online learning platform.

Factors solve the problem of SDL: This component explores the factors that help university students solve the problem of SDL in online learning. It consists of six main themes. Reforming online teaching and learning models, building a mechanism for monitoring and evaluating SDL,

strengthening university students' knowledge of SDL, improving online learning resources, improving methods of teaching SDL, and creating an online favorable atmosphere of SDL for university students.

The conceptual framework creates a comprehensive narrative for understanding university students' SDL in online learning. It acknowledges the complexity of SDL in online learning by examining perceptions and factors. By doing so, it provides a roadmap for researchers to explore the dynamics of SDL in online learning in the specific context of university students. This framework serves as a guide for investigating the intricate interplay between perceptions and factors in the realm of SDL in online learning.

This study included only graduates from China at the undergraduate level. In addition, caution must be exercised in interpreting the results in any definitive or global way, as the conclusions of this study are based on a small number of interviews. Future studies can also be conducted among students from other countries and universities. This study can also be done among students of different majors and levels. The study has a limitation of sample size, which could cause differences in the results. A similar study with a large sample size can be planned and conducted in the future.

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## CONFLICT OF INTEREST

The authors of this publication declare there are no competing interests.

## KEY TERMS AND DEFINITIONS

**Self-directed learning:** Without the help of others, a person can take the initiative to diagnose his own learning needs, set learning goals, determine human and material resources for learning, select and implement appropriate learning strategies, and evaluate learning outcomes.

**Online learning:** Online learning refers to the use of modern information technology means of learning and teaching activities through the Internet, which changes the role of teachers and the relationship between teachers and students in traditional teaching and fundamentally reforms the conventional teaching structure and the nature of education to achieve the purpose of cultivating talents.

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