

THE RELATIONSHIP BETWEEN STUDENTS' DIGITAL-SELF-EFFICACY AND ONLINE LEARNING MOTIVATION AT S UNIVERSITY FOR THE ELDERLY IN ZHENGZHOU, HENAN PROVINCE, CHINA

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Abstract: The rapid development of China's aging population and digitalization has brought new opportunities and challenges to the education of the elders. Online learning provides a new way for the elderly's education. This study distributed questionnaires to 213 students at S University for the Elderly in Zhengzhou, Henan Province, China, and recovered 196 valid questionnaires. This study made a descriptive analysis of the status quo of students' digital self-efficacy and online learning motivation at S university for the elders; and explored the differences and correlations between the two variables under different background variables. The research found that the students' digital self-efficacy at S university for the elders was at a medium level, and their online learning motivation was at a high level. There was no significant difference in the digital self-efficacy of senior college students, but there was a significant difference in online learning motivation. Meanwhile, there was a significant positive correlation between students' digital self-efficacy and online learning motivation at S university for the elders in Zhengzhou, China. Finally, recommendations were provided based on the research findings.

Keywords: University for the Elderly, Students' Digital Self-Efficacy, Online Learning Motivation

Introduction

With the continuous progress of medical technology and the continuous improvement of living standards, human life expectancy is also growing. This has led to an increase in the number of people aged 60 years and over in the world. Chetty, Qigui, Gcora, Josie, Wei, & Fang (2018) believed that the changing population structure has become a global issue of concern.

China is one of the countries facing the problem of aging, with its population reaching 1,411.75 million by the end of 2022, according to data released by China's National Bureau of Statistics. The number of people aged 60 and above reached 280.04 million, accounting for 19.8 percent of China's total population, an increase of 12.68 million compared with 2021. China's population is already

experiencing negative growth, with the aging population increasing more than the number of new births. At the same time, the digital industry is developing rapidly and has been widely used worldwide.

Xie (2022) pointed out in the study that learning can promote the elderly to better adjust themselves, enable them to master new skills, and better adapt to social development. To actively respond to the challenges brought by aging and digitalization, the General Office of the State Council of China issued the Notice on the Implementation Plan for Effectively Solving the Difficulties of the Elderly in Using Intelligent Technology in 2020, which clearly proposed that the ability of the elderly to use intelligent technology should be strengthened as the key content of elderly education. We will actively promote various educational institutions to develop an all-media curriculum system for the elderly. Through universities (schools) for the elderly, elderly care service institutions, community education institutions, etc., online, and offline integration is adopted to help the elderly improve their ability and level to use intelligent technology. The Fourteenth Five Year Plan for Zhengzhou Education Development (2021-2025) clearly puts forward the importance of establishing public digital lifelong education resources. Make full use of information technology to build an open, diversified, and flexible continuing education platform, optimize the learning environment, and realize the full coverage of large-scale intelligent learning platform for all learners.

Focusing on the education for the elderly, this study explores the learning situation of elderly college students in the context of the rapid development of aging and digitalization. This study investigated the relationship between digital self-efficacy and online learning motivation among the students at S University for the Elders in Zhengzhou, Henan Province, China. The purpose of this study is to help the elderly participate in learning and promote digital integration for schools and communities. It provides a reference basis for the digital development of Zhengzhou's elderly education management. At the same time, based on the problem orientation, suggestions are proposed to enhance the elderly's digital self-efficacy and online learning motivation.

Research Objectives

(1) To identify demographic background variables of the students at S University for the Elders in Zhengzhou, Henan Province, China, including their gender, age, education level and monthly income.

(2) To compare the differences of students' digital self-efficacy at S University for the Elders in Zhengzhou, Henan Province, China under different background variables (gender, age, education level, monthly income).

(3) To compare the differences in students' online learning motivation at S University for the Elders in Zhengzhou, Henan Province, China under different background variables (gender, age, education level, monthly income).

(4) To determine the relationship between the students' digital self-efficacy and online learning motivation at S University for the elders in Zhengzhou, Henan Province, China.

Literature Review

Research on Digital Self-Efficacy

Zhang, Chen, Mao & Wen (2021) believed that digital self-efficacy was based on Bandura's self-efficacy theory and was the application of self-efficacy in more specific fields. Digital self-efficacy refers to the self-efficacy of individuals in effectively and effortlessly using information technology and adapting to hardware and software updates. Ulbert & Schmidt (2022) believed that digital self-efficacy refers to a person's confidence in the successful use of digital systems in the future. Bawden (2008) believes that many terms refer to the ability of individuals to use information and communication technologies. These technologies are usually composed of the types of technologies they refer to (such as ICT, computers, and the Internet) and the types of knowledge required for their effective operation (such as literacy, skills, and capabilities). Information and communication technology self-efficacy, that is, personal understanding of their own capabilities in information and communication technology.

Senkbeil & Ahme (2017) emphasized that ICT covers both technology and information, and ICT has been widely used in people's work, study, and daily life. Computer self-efficacy is also an important part of ICT self-efficacy. Aesaert, Vanderlinde, Tondeur & Braak (2014) highlighted the comprehensive ability judgment of computer self-efficacy by combining general computer self-efficacy with computer self-efficacy of specific tasks. Moreover, Gatti, Brivio & Galimberti (2022) studied digital self-efficacy based on the use of tablet computers by the elderly in their research. In recent years, with the progress of science and technology and the increase of Internet use, network technology, as a new means of information dissemination, is providing us with more abundant and convenient services.

Skilled use of digital systems has become a key skill in most areas of life, including education and work. Knowledge and skills about digital devices (such as computers, smartphones, tablets), applications and the environment are defined by OECD as skills in the 21st century, because they are crucial to participating in education, work and daily life in modern society. Ulbert, Antoni & Ellwart (2022) conducted a study on adults' digital self-efficacy through the digital system. This research proves that the self-efficacy related to the use of digital systems can predict the effective use of digital systems. Eastin & LaRose (2000) research shows that ability beliefs, such as digital self-efficacy, are a person's confidence in the successful use of digital systems in the future, which determines whether and how individuals use digital systems, or whether they are willing to use them. Because of their central role in the interaction with digital technology, Janssen, Stoyanov, Ferrari, Punie, Pannekeet & Sloep (2013) described digital self-efficacy as the "cornerstone" of digital ability.

In summary, different scholars have studied digital self-efficacy from different perspectives. It

proves that it is feasible to study digital self-efficacy based on the specific areas of ICT, Internet, digital devices, and digital systems. By sorting out the concepts and studies related to digital self-efficacy, the author has gained a deeper understanding of digital self-efficacy, which lays the foundation for this investigation and research. The research on digital self-efficacy not only helps to promote the development of digital society, but also provides reference for practitioners of gerontological education, and provides a basis for promoting the digital development of gerontological education.

Research on Online Learning Motivation

Research on motivation arose in psychology around 1930, and different scholars have interpreted motivation differently. Wang Yang & Jiang (2022) believed that there exists a driving force behind human behavior. Human motivation is variable, which largely reflects the intensity, direction, and persistence of the individual's efforts to achieve a goal and is closely related to human behavior. Motivation is often used to explain what drives human behavior and why, and this study focuses on the field of online learning motivation.

Ausubel, a famous American educator, believes that there is a mutually reinforcing relationship between motivation and learning. Fan & Zhang (2007) pointed out that the study of learning motivation has gradually shifted from the edge to the core position. Huang (2020) emphasized that learning motivation plays an important role in the learning process. It can stimulate students' learning activities, maintain their learning behavior, and guide students to work hard to achieve goals. Because of the diversity of motives, the theories derived from it are also numerous. After 1960, influenced by cognitive views and social cognitive views, motivation research began to introduce the important variable of cognitive moderating factors. Since then, reinforcement theory, attribution theory, hierarchy of needs theory and achievement goal theory have had a profound impact on the study of learning motivation.

Wang, Peng & Huang (2006) categorized adult online learners' motivation for online learning into three dimensions, including cognitive, self-improvement, and affiliation, using adult learners in online education colleges as subjects. The results of the study showed that adult e-learning motivation was composed of cognitive and self-improvement motivation. This study provides new ideas for the study of adult e-learning motivation. In addition, the motivation of male learners was lower than that of female learners. The motivation of married learners was lower than that of unmarried learners. The motivation of learners in economically favorable areas is significantly higher than that of learners in economically unfavorable areas. Wei (2007) studied and analyzed online learners' motivation in six dimensions: external expectations, social services, career development, escape or stimulation, social contacts and interest in knowledge.

The online learning motivation of the elderly has its own characteristics compared with the online learning motivation of ordinary in-service adults. Jie & Zuo (2019), according to different age groups and gender, investigated and studied the elderly who participated in MOOC learning from six

aspects: problem solving, knowledge acquisition, cognitive improvement, fun seeking, benefiting others, and social contact. Among them, problem solving was the most popular choice.

Shroff, Vogel & Coombes (2008) pointed out that online learners have stronger internal motivation than offline learners. Tsai, Lin, Hong & Tai (2018) pointed out that online learning environment lacks face-to-face guidance and attention from teachers, and there are few external incentives such as punishment and social pressure. Xie (2022) combed and analyzed the motivation and needs of online learning for the elderly from five dimensions: psychophysiology, living habits, social interaction, knowledge and skills, and health and safety. He pointed out that in the face of the challenges brought about by the aging population, the development of education for the elderly is an effective way to solve the problem, which is conducive to building a learning society of lifelong learning. To sum up, the author finds that the dimensions of adult online learning motivation are different in the context of academic education and non-academic education.

Understanding the characteristics of the elderly's motivation to participate in learning, and paying attention to and stimulating the elderly's online learning motivation throughout the learning process to keep their interest in learning can provide useful reference for improving and developing China's elderly education. Through literature review, it is found that there is less attention paid to the online learning motivation of the elderly group. Therefore, this study focuses on the elderly to explore their online learning motivation.

Research on the Relationships between Digital Self-Efficacy and Online Learning Motivation

Cetin (2016) believed that learners with strong self-efficacy have higher ability beliefs and success expectations, which will stimulate learners to improve online learning motivation. Self-efficacy is closely related to online learning motivation. Li (2012) took 320 undergraduate students in a normal university as research objects to explore the relationship between college students' general self-efficacy and online learning motivation. The study found that there were significant differences in general self-efficacy among college students in different grades. In terms of overall online learning motivation, there is no significant difference between male and female college students. However, there are significant differences between male and female college students in the pursuit of return dimension of the exogenous motivation subscale. In addition, there is a high positive correlation between general self-efficacy and students' online learning motivation, which can predict students' online learning motivation through general self-efficacy.

Huang & Li (2019) explored the relationship between college students' learning motivation and self-efficacy with 120 college students as subjects. The results show that there are significant differences in learning motivation between college students of different genders, grades, and whether they are only children or not. There is no significant difference in the self-efficacy of college students in terms of

gender, grade, major and whether they are only children. In general, self-efficacy has a significant positive correlation with endogenous motivation and has nothing to do with exogenous motivation.

Chi & Xin (2006) measured 270 college students to explore the relationship between college students' learning motivation and self-efficacy. The results show that college students' self-efficacy in general and specific fields is positively correlated with internal motivation, but not with external motivation. Specifically, the higher the self-efficacy of college students, the higher their internal motivation. The college students with higher self-efficacy have higher confidence in their own ability judgment and the expected results of activities. In addition, self-efficacy is positively correlated with internal motivation and external motivation. Specifically, self-efficacy is positively correlated with the dimensions of challenge, enthusiasm, and concern for interpersonal competition, and significantly negatively correlated with the dimension of choosing simple tasks.

Gao (2021) conducted a random survey of 1901 local college students to explore the relationship between learning motivation and self-efficacy of local college students. The study found that there was a significant positive correlation between college students' learning motivation and self-efficacy. The learning motivation of college students increases with the increase of self-efficacy. Therefore, improving college students' self-awareness and self-evaluation level can promote the enhancement of learning motivation. In addition, in terms of learning motivation and self-efficacy, college students have significant differences in their mother's cultural level. In the dimension of seeking knowledge and making progress, college students' mothers with college education and above scored the highest.

In conclusion, there is a significant positive correlation between self-efficacy and online learning motivation. Students with a relatively high sense of self-efficacy and online learning motivation are more able to concentrate on dealing with the challenges they face in their learning life and try to solve the problems they encounter. When they successfully overcome learning difficulties through their own efforts, this successful experience will enhance their sense of self-efficacy and further stimulate their online learning motivation. This will help improve students' ability to solve problems, overcome the impact of adverse factors, and thus enhance online learning motivation. On the contrary, if the self-efficacy of individuals is low, they are more inclined to passive avoidance in the face of difficulties in learning, resulting in a decline in academic performance, thereby further reducing self-efficacy. In the past studies, scholars mostly focused on the groups receiving academic education, and there were few studies on the digital self-efficacy and online learning motivation of the elderly.

Methodology

This researcher adopted the form of questionnaire and took the students at S University for the Elderly in Zhengzhou, Henan Province, China as the respondents. Through all sampling, 213 senior

college students were given study questionnaires, 209 of which were returned, with a recovery rate of 98%. 196 valid questionnaires were screened, with an effective rate of 92%.

This research adopted the Students' Digital Self Efficacy Scale from the study of Ulfert & Schmidt (2022) to measure the digital self-efficacy of S university for the elders. Cronbach's α and KMO values were 0.887 and 0.928, respectively. The factor loads of all items were good, with good reliability and validity, and were used in this study. Based on the Adult Online Learning Motivation Scale under Unconstrained Conditions prepared by Wu (2019) et al α and KMO values were 0.957 and 0.930, respectively. The reliability and validity were at a good level.

Results

Demographic Analysis of Questionnaire Participants

About the gender of the study, there were 196 male and female students, of which 87 were male, accounting for 44.44%; The number of women was 109, accounting for 55.56%. In terms of age, there were 93 students aged 60-69, accounting for 47.45%. The second group, aged 50-59, had 56 people, accounting for 28.57%. There were 47 elderly people aged 70 and above, accounting for 23.98%. In terms of educational level, there were 88 students with educational level of high school (vocational college) or below, accounting for 44.90%, 80 students with educational level of junior college or undergraduate, accounting for 40.82%, and 28 students with educational level of master or above, accounting for 14.28%. In terms of monthly income, 45 students had a monthly income of 3000 RMB or less, accounting for 22.96%, 72 students had a monthly income of 3001-6000 RMB, accounting for 36.73%, 42 students had a monthly income of 6001-9000 RMB, accounting for 21.43%, and 37 students had a monthly income of 9001 RMB or more, accounting for 18.88%.

Descriptive Statistics on the Digital-Self-Efficacy and Online Learning Motivation

As shown in Table 1, the mean values of students' digital self-efficacy at S university for the elders was 3.65, and the mean in five dimensions of information and data literacy, communication and collaboration, digital content creation, security, and problem solving is higher than 3, which indicates that the overall students' digital self-efficacy of S university for the elders was at a moderate level.

Table 1: The Level of Students' Digital Self-Efficacy at S University for The Elders

Dimension	Mean	SD	Interpretation
Information and Data Literacy	3.86	0.75	Moderate
Communication and Collaboration	3.78	0.74	Moderate
Digital Content Creation	3.49	0.79	Low
Security	3.74	0.80	Moderate
Problem Solving	3.35	0.85	Low
Digital Self-Efficacy Overall	3.65	0.69	Moderate

As shown in Table 2, the mean values of students' online learning motivation at S university

for the elders was 4.04, and the mean of five dimensions of cognitive interest, interpersonal relationship, getting rid of routine, external influence, and social service was higher than 3, which indicates that the overall students' online learning motivation at S university for the elders was at a high level.

Table 2: The Level of Students' Online Learning Motivation at S University for The Elders

Dimension	Mean	SD	Interpretation
Cognitive Interest	4.28	0.54	High
Interpersonal Relations	4.02	0.69	High
Escape from Routine	4.09	0.59	High
External Influences	3.68	0.81	High
Social Services	4.10	0.66	High
Online Learning Motivation Overall	4.04	0.54	High

Differences Analysis on the Digital Self-Efficacy and Online Learning Motivation Compared with Demographic Factors

There is no significant difference in the overall digital self-efficacy and its dimensions among S elderly university students of different genders, ages, literacy levels, and monthly incomes. There is no significant difference in the overall online learning motivation and its dimensions among S elderly university students of different genders and ages. There is a significant difference in the overall online learning motivation and its dimensions among S elderly university students with different literacy levels and monthly incomes.

Correlation Analysis among Two Main Variables

As shown in Table 3, the results showed that the correlation coefficient r between digital self-efficacy and online learning motivation was 0.462, and the r values of the whole and all dimensions were greater than 0.01, indicating that the digital self-efficacy of S elderly college students was significantly correlated with online learning motivation.

Table 3: Summary of Correlation Analysis of Variables

Dimensions	Cognitive Interest	Interpersonal Relations	Escape from The Routine	External Influences	Social Service	Online Learning Motivation Overall
Information and Data Literacy	.491**	.225**	.223**	.212**	.270**	.335**
Communication and Collaboration	.487**	.282**	.279**	.275**	.354**	.400**
Digital Content Creation	.390**	.281**	.302**	.325**	.350**	.400**
Security	.492**	.369**	.379**	.334**	.443**	.485**
Problem Solving	.369**	.299**	.294**	.348**	.360**	.408**
Digital Self-Efficacy Overall	.508**	.332**	.336**	.340**	.405**	.462**

Discussion

Basic Status of Digital self-efficacy and Online Learning Motivation

This study found that the digital self-efficacy of S senior college students was at a medium level. This study found that the students' online learning motivation level of S University for the Elders was at a high level. The mean value of external influence in the five dimensions was 3.68, and the mean value of the other four dimensions was more than 4.

Differences of Digital self-efficacy and Online Learning Motivation Under Different Demographic Factors

There is no significant difference in the digital self-efficacy of S elderly university participants across gender, age, education level and monthly income. There is no significant difference in the online learning motivation of S older college students across gender and age. There is no significant difference in the online learning motivation of S older college students with different literacy levels and monthly incomes. These findings were consistent with the research results of Huang (2019), Czaja et al (2006), Gatti, Brivio & Galimberti (2017) , and Wu et al. (2014).

Relationship among Digital self-efficacy and Online Learning Motivation

This study found that there is a significant positive correlation between students' digital self-efficacy and online learning motivation of S university for the elders, which is consistent with the research results of Wu et al. (2014). The higher the digital self-efficacy of the elderly college students, the higher their online learning motivation. Among them, this study found that there was also a significant correlation between students' digital self-efficacy and online learning motivation dimensions.

When older learners have higher digital self-efficacy, they are more likely to believe that they can successfully complete the online learning tasks and receive positive feedback and a sense of accomplishment. This kind of confidence can motivate them to participate in e-learning activities more actively and increase their learning motivation. For example, digital self-efficacy can influence participants' perceived interest in e-learning. When learners have high digital self-efficacy, they are more likely to believe that they can successfully use and master the e-learning platform and technology tools. This confidence will increase their interest in e-learning and motivate them to participate actively in learning. On the contrary, if learners lack confidence in their digital competence, they may feel confused and uneasy about online learning, thus reducing their motivation to learn.

On the interpersonal dimension, learners with higher digital self-efficacy may be more likely to establish good learning relationships with others, which may enhance their motivation to learn online. When learners have high digital self-efficacy, they are more likely to believe that e-learning can provide better learning experiences and opportunities. As a result, they are more likely to be motivated to move away from traditional forms of education and choose e-learning as their primary mode of learning. As

a result, they will be more motivated to participate in e-learning to realize the dual goals of personal development and social service.

In conclusion, the results of this study show that there is a significant positive correlation between digital self-efficacy and online learning motivation of S elderly college students. Therefore, in the educational practice of universities for the elderly, it should attach importance to cultivating students' digital self-efficacy and help them build self-confidence by providing suitable digital technology training and support for students, to enhance their motivation and enthusiasm for online learning. At the same time, by making students have online learning motivation to teach, so that they can enhance their belief in digital self-efficacy and ability to judge, can calmly face the rapid development of digital learning and life, and enjoy the dividends of digital.

Conclusions

The digital self-efficacy of the students at S University for the elders in Zhengzhou, Henan Province, China was generally at a medium level, and the online learning motivation was generally at a high level.

In terms of gender, there was no significant difference in the number self-efficacy of students of different genders; There was no significant difference in online learning motivation between students with different genders.

In terms of age, there was no significant difference in the number self-efficacy of students of different ages; There was no significant difference in online learning motivation among students of different ages.

In terms of educational level, there was no significant difference in digital self-efficacy among students with different educational levels, and there was significant difference in online learning motivation among students with different educational levels.

In terms of monthly income, there was no significant difference in the digital self-efficacy of students with different monthly income, and there was a significant difference in online learning motivation of students with different monthly incomes.

There was a significant positive correlation between digital self-efficacy and online learning motivation, and there was a significant positive correlation between digital self-efficacy and various dimensions of online learning motivation.

In conclusion, this study not only explored the students' digital self-efficacy and online learning motivation of S University for the Elders, but also comprehensively analyzed the influencing factors. These findings not only reveal the unique characteristics of elderly college students in digital learning, but also point out the challenges they may face in learning. Understanding the differences, correlations and influencing factors between the two can provide more accurate and personalized learning support

and services for the elderly.

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