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RESEARCH ON A STRATEGY FOR ENHANCING THE DIGITAL SELF-EFFICACY OF TOWNSHIP PRIMARY SCHOOL STUDENTS: A FIELD INVESTIGATION OF A TOWN PRIMARY SCHOOL IN YUNFU CITY

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Abstract
This study explores the factors and mechanisms affecting the digital self-efficacy of primary school students and studies strategies to improve the digital self-efficacy of primary school students in towns and villages to better adapt to the era of "education digitization". **Methods** Forty Grade 4 and 5 students from a town in Yunfu City were selected and investigated using a questionnaire. **Results:** There was a significant correlation between the digital self-efficacy of primary school students and their parents' companionship and whether they independently owned their own mobile phones. **Conclusion:** Parents and teachers should take measures to enhance students' digital self-efficacies.

1. Introduction

Early in January 2022, the China State Council issued the "14th Five-Year Plan for Digital Economy Development", clearly proposing smart education and digital village construction projects, emphasizing the sustainable and healthy development of "Internet + education", and relying on the Internet and other channels to promote high-quality education resources to cover schools in rural and remote areas. At the same time, the National Education Work Conference proposed the implementation of the national education digital strategy action. However, data from the 5th National Underage Internet Use Survey Report show that 24.3 percent of underage Internet users cannot access the Internet due to lack of Internet access equipment, 30.6% of underage Internet users said they do not query or search for information, and 34.9% of underage Internet users said they do not know how to download or install software. 14.1% of young primary school students said they only watch videos, play games, and read web pages on the Internet; And the proportion of underage netizens with skills of programing, writing code, and making web pages and apps, which belong to the higher level of Internet skills, is 10.8% and 8.6%. People unable to afford Internet are of 6.9 percent; The proportion of those parents and teachers who did not allow Internet access reached 66.8%, while the proportion of those who learned Internet skills through school-related courses and from parents was 25.6% and 22.7%, respectively.

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It is known that one of the most important reasons for the digital divide is the level of economic development, which is reflected in the inequality of economic development between different geographical locations and households, concretely reflected in the inability to buy digital learning equipment, or the lack of advanced digital infrastructure. Therefore, the specific situation of digital product use is not as optimistic as the Internet penetration rate shows[i]. The economic base of a family not only determines the opportunity for children to acquire network equipment but it also has an important impact on their knowledge reserve[ii]. Therefore, in families with relatively difficult economic foundations, children lack the opportunity to own digital products independently, resulting in insufficient mastery of advanced digital product skills, and their parents cannot guide children to use digital products well, resulting in children lacking the conditions to contact, use, and learn digital products. To sum up, children from families with economic difficulties more or less lack the economic conditions or opportunities to contact, use, and learn digital products, coupled with their parents' neglect or lack of knowledge in this regard, resulting in children lacking the ability to use digital products. Or the subjective judgment and concept of whether they can use digital products well (that is, digital self-efficacy) show a negative attitude, which is not conducive to adapting to the national important concept and trend of "education digitalization".

Therefore, we will conduct a field research and select 40 fourth and fifth grade students from a township primary school in Yunfu City as research objects to explore the influencing factors and mechanisms of the development of digital self-efficacy among township primary school students and study improvement strategies.

2 Digital self-efficacy

In the 1980s, Bandura proposed the concept of self-efficacy, which refers to an individual's subjective judgment of whether he or she can complete a certain task. Later, it more reflects a person's belief and attitude toward himself or herself. It has become an important psychological quantity in psychology, affecting an individual's persistence, choice tendency, and behavior attitude, thus further affecting the results of individual behaviors. Influenced by the development of the field of artificial intelligence, the academic community has gradually come up with a definition of "digital self-efficacy", which is the belief that an individual has when using digital devices or digital systems. In other words, individuals judge whether they can use devices or systems to complete tasks[iii]. The devices and systems described here can be considered digital products.

Digital products can be divided into tangible and intangible products. Tangible digital products refer to electronic products based on digital technology, such as digital cameras, digital TV sets, digital camcorders, MP3 players, VCDS, and DVDS. Intangible digital Products, also known as Digitalized Products, refer to products that can be digitized and transmitted through digital networks such as the Internet[iv]. In this paper, we focus on tangible digital products, that is, many products based on digital technology, which are typically represented by smartphones and include electronic intelligent products such as computers and televisions.

3 Methods

In this survey, we selected 40 primary school students in Grades 4 and 5 (the number of students in grade 2 is half) as the research subjects and conducted the research using a questionnaire survey.

3.1 questionnaire establishment

Self-efficacy, as a self-centered structure, requires direct rather than indirect measurement; thus, self-efficacy is often measured using self-report scales[v]. Since there are still few studies on digital self-efficacy in China, we consulted many studies using keywords such as digital literacy and digital self-efficacy and comprehensively analyzed the degree of correspondence between the questionnaires and scales proposed therein and the theme direction of this survey. Finally, the contents of the second and third parts of the *questionnaire on the current situation of the digital divide of rural primary school students*[vi] are selected as the first and second parts of our

research questionnaire, aiming to measure the local primary school students' perception of their ability to use digital products in the form of self-report, that is, digital self-efficacy. The questionnaire was divided into two types of questions: multiple-choice questions and judgment questions. The multiple-choice question is about contact and use of digital devices, including ownership of computers and mobile devices, the main activities and preferences of the Internet, and guardians' supervision. The content of online activities and preferences is mainly adapted from the questionnaire of the "2021 National Underage Internet Use Research Report"[vii]. The core content of the judgment question is mainly an assessment scale of digital skills. In the question setting, it mainly draws on the five dimensions proposed by domestic scholar Li Xiaoping in the *Construction and Verification of the Assessment Framework of Digital Skills for primary and secondary School students*, which are operational, information, creative, social, and security skills[viii].

3.2 field investigation

To ensure that all the students in the survey could be present and have sufficient time to complete the paper version of the questionnaire, the team selected the school recess period (about 15 minutes) to distribute questionnaires to a total of 40 students in two grades. Before students fill in the questionnaire, the team will explain the filling requirements and arrange team members to explain the questions and fill in the questionnaire during the students to ensure the effectiveness and accuracy of the survey results.

4 Analysis

A total of 40 questionnaires were issued in this survey, and 37 valid questionnaires were obtained after elimination of sample data with regular responses and invalid options, with an effective rate of 92.5%.

Based on the Likert scale score setting (5-1 points for strongly agree and strongly disagree), we calculated the total score of various parts of the report, set the prerequisite logic conditions, cross-analyzed the self-reported score of digital self-efficacy with the previous multiple-choice questions such as the use of digital products, and made the following report:

Question 2: "Do you have a cell phone?" with self-reported scores: For students, using their own mobile phones may be psychologically different from using their parents' mobile phones. In this survey, it is found that some students are more inclined to play games and other recreational behaviors when using their parents' mobile phones, but they were more inclined to do other activities, such as social chatting and Internet research, when using their own mobile phones. Therefore, we hypothesized that owning a mobile phone or not would impact students' digital self-efficacies. According to the logical setting of question options, we screened out the sample data of two different options "yes" and "no" in question 2, respectively, and found that the average score of digital self-efficacy self-reported by students with their own mobile phones was higher than that of students without their own mobile phones, and the minimum score of the former was higher than that of the latter (As Table 1). Therefore, we believe that having a mobile phone will enable primary school students to try more types of activities on their own, rather than just entertainment. In the process, primary school students' sense of digital self-efficacy will be improved.

Table 1. Cross-analysis of students' own mobile phones and their self-reported scores for digital self-efficacy

	Students using their cell phones	Students without cell phones
Self-reported average score	79.85	72.38
Lowest self-reported score	64	59

Question 9: "Do your parents limit the time you spend online?" with self-reported scores. There are three answers to question 9, but only two options are selected, "strictly limited" and "sometimes limited". According to the

selected answers to this question, we perform the option logic settings and respectively screen out the sample data that choose these two different options. We find out by comparison that the average score of digital self-efficacy self-reported by students whose Internet time was strictly restricted by their parents is lower than that of students whose parents sometimes restricted their Internet time. The average score difference between the two groups was approximately 10 points, indicating a significant difference (As Table 2). Therefore, we believe that parents' excessive restriction or interference in Internet use may have some impact on students' digital product use ability, or at least have a negative impact on students' belief in their digital product use ability, that is, digital self-efficacy.

Table 2: Cross-analysis of the relationship between parental control over Internet time and students' self-reported scores for digital self-efficacy

	strictly limited	sometimes limited
Self-reported average score	71.64	79.65
Lowest self-reported score	59	64

Question 10: "Do your parents accompany you when you use media such as cell phones, computers, etc.?" with self-reported scores. We respectively screened and compared the self-reported scores of the samples who chose different answers "often accompany", "sometimes accompany" and "never accompany" in question 10, and found that the students whose parents often accompany the use of digital products had a higher average score in the digital self-efficacy self-report part of the judgment question than the students who chose the other two groups. The lowest score was much higher than that of the other two groups of samples (As Table 3). Parents' companionship has a certain promoting effect on the improvement of primary school students' ability to use digital products; that is, it can improve the digital self-efficacy of primary school students to a certain extent.

Table 3: Cross-analysis of the frequency of parents' companionship when primary school students use digital products and the self-reported scores of primary school students' digital self-efficacies

	often accompany	sometimes accompany	never accompany
Self-reported average score	80	76.21	76.2
Lowest self-reported score	70	60	59

5 Results

(1) Using their own mobile phones independently will enable primary school students to engage in more types of activities with their mobile phones instead of purely recreational activities. This process will improve primary school students' sense of digital self-efficacy.

(2) Parents' excessive restriction of time on the Internet or interference in the use of digital products will have a certain impact on primary school students' ability to use digital products, or at least lead to students' subjective judgment and belief in their ability to use digital products, that is, digital self-efficacy.

(3) Parents' companionship plays a positive role in promoting the improvement of primary school students' ability to use digital products and can play a certain guiding role, which can improve the digital self-efficacy of primary school students to a certain extent. Parents should pay attention to cultivating the ability to use digital products, which will have an expected effect on improving students' sense of digital efficacy.

6 Suggestions

(1) Create conditions for primary school students to contact, use, and learn digital products.

Parents should have an awareness of cultivating children's digital literacy and should equip primary school students with digital products, such as smartphones and smart watches, if conditions are right. To the government,

when issuing national funding to help families with financial difficulties, part of the funding amount can be converted into a digital product or product voucher, such as smart watches, smart phones and other digital products, and the government will make up the difference in equipment purchase, so as to achieve financial assistance and create conditions for students to use digital products.

(2) The use time of digital products should be appropriately limited for primary school students.

Parents should not regard the use of digital products (such as smart phones) simply as a bad behavior that harms students' physical and mental health, so as to strictly restrict or prohibit students' use of digital products, but should give students certain time and space to use digital products (such as using mobile phones) and encourage them to explore various functions of using digital products. In the long run, this will establish a certain foundation for the use of digital products by primary school students, which will be conducive to their future study and life.

(3) Advancing primary school students in using digital products

When students use digital products, such as mobile phones, parents should actively participate in accompanying them, guiding primary school students to correctly and healthily use their mobile phones, which can prevent their addiction to video games. At the same time, parents can work with students to learn and use digital products, play the role of school supervisors and students, arouse the interest of primary school students in learning, make them dare to explore more functions of digital products, develop independent exploration ability, and then improve the digital self-efficacy and digital education literacy of primary school students.

(4) Give full play to teachers' guiding role

Primary school students have strong learning abilities and are good at imitation. They like to take excellent people around them as their role models and strive to make themselves as close to these role models. Primary school students spend the most time in contact with their teachers. They regard their teachers as their role models, arouse their desire to study hard, and want to catch up with the pace of their role models. After receiving positive feedback, such as encouragement and affirmation from their role models, the participants will have more enthusiasm for learning and their sense of self-efficacy will also be enhanced. Therefore, teachers should pay attention to setting an agenda, consciously conducting universal education on the use of digital products for primary school students on campus, guiding them to cultivate the consciousness of correct and healthy use of digital products, and laying a good ideological foundation.

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Annex 1

Questionnaire on the digital self-efficacy of primary school students in a township

Dear students,

Hello! To understand the use of digital products and the performance of digital self-efficacy of primary school students, I would like to ask you a few relevant questions. Please answer according to your situation. We will keep your privacy strictly confidential and will not share your information with others, including your parents and teachers. Please feel free to fill in. Thank you very much.

Part I:

1. The computer you have at home is: [Multiple choice]

A. Desktop computer B. laptop computer C. Tablet computer D. No computer

2. You have your own phone: [Single choice]

A. Yes B. No

3. How much time do you spend online on average a day? [Multiple choice]

A. Within 1 h B.1-3 hours C. More than 3 h

4. What do you usually do online: [Multiple choice] (Choose a maximum of three)

A. Listen to music B. Play games C. chat D. Read novels E. Watch short videos

F. Learning online G. Watching news H. Watching live stream I. Online shopping J. Watching movies and television plays

5. Short videos of what you usually like to watch: [multiple choice] (Choose a maximum of three)

A. Funny B. Leisure C. Interest D. Learning

E. Games F. Current affairs and politics G. Variety H. Science and Technology

6. The learning activities you usually use the Internet for are: [Multiple choice] (Choose a maximum of three)

A. Locate information B. Read outside class C. Do homework D. Memorize words

E. Answer questions online F. Watch online courses G. Do not perform the above activities

7. What do you think about the impact of using mobile phones and computers on study and life?

A. positive B. Negative C. No effect

8. What do you think about learning computer technology: [multiple choice]

A. Very easy B. Relatively easy C. relatively difficult D. Very difficult

9. Do your parents limit your online time? [Multiple choice]

A. Strict limits B. Sometimes limits C. never limits

10. Do your parents accompany you when you use mobile phones, computers, etc.?

A. Always accompany B. Sometimes accompany C. Never accompany

Part Two:

1. I can type Chinese characters on my phone or computer.

A. Can’t agree more B.Generally agree C. I'm not sure D. Disagree E. Strongly disagree

2. I can install and uninstall software on my phone or computer.

A. Can’t agree more B.Generally agree C. I'm not sure D. Disagree E. Strongly disagree

3. I know how to use video software to play the video I want to watch.

A. Can’t agree more B.Generally agree C. I'm not sure D. Disagree E. Strongly disagree

4. I know how to find the information I need in search engines such as Baidu.

A. Can’t agree more B.Generally agree C. I'm not sure D. Disagree E. Strongly disagree
5. I know how to type and open a web address in my browser.
A. Can’t agree more B.Generally agree C. I'm not sure D. Disagree E. Strongly disagree
6. I know how to download the resources I need (such as pictures, documents, music, etc.).
A. Can’t agree more B.Generally agree C. I'm not sure D. Disagree E. Strongly disagree
7. I can add frequently visited Web pages to my favorites.
A. Can’t agree more B.Generally agree C. I'm not sure D. Disagree E. Strongly disagree
8. I can independently judge the authenticity, reliability, and authority of network information.
A. Can’t agree more B.Generally agree C. I'm not sure D. Disagree E. Strongly disagree
9. I know how to use a computer to edit, format, and save articles.
A. Can’t agree more B.Generally agree C. I'm not sure D. Disagree E. Strongly disagree
10. Video software can be used to make a video.
A. Can’t agree more B.Generally agree C. I'm not sure D. Disagree E. Strongly disagree
11. I know how to use photo editing software to combine multiple images.
A. Can’t agree more B.Generally agree C. I'm not sure D. Disagree E. Strongly disagree
12. I will share my comments on the website.
A. Can’t agree more B.Generally agree C. I'm not sure D. Disagree E. Strongly disagree
13. I like and comment on other people's posts.
A. Can’t agree more B.Generally agree C. I'm not sure D. Disagree E. Strongly disagree
14. I often communicate with my friends through qq, wecht, and other social media.
A. Can’t agree more B.Generally agree C. I'm not sure D. Disagree E. Strongly disagree
15. I have a good sense of privacy protection (such as phone number, home address, etc.).
A. Can’t agree more B.Generally agree C. I'm not sure D. Disagree E. Strongly disagree
16. I know how to find information about safe Internet use.
A. Can’t agree more B.Generally agree C. I'm not sure D. Disagree E. Strongly disagree
17. I know where it is safe to download software.
A. Can’t agree more B.Generally agree C. I'm not sure D. Disagree E. Strongly disagree
18. If I encounter Internet risks (such as Internet fraud, Internet violence, information harassment), I will immediately report to my parents, teachers, or elders.
A. Can’t agree more B.Generally agree C. I'm not sure D. Disagree E. Strongly disagree
19. I never hide my parents’ private game recharges, live rewards, and other online consumption activities.
A. Can’t agree more B.Generally agree C. I'm not sure D. Disagree E. Strongly disagree

The questionnaire has been completed. Thank you for your attention. Finally, I would like to ask you one more small favor: Please take another minute to look over the questionnaire you have filled out and see if there are any mistakes or omissions. Thank you!