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# A Study on Factors Influencing Digital Reading Behavior of Junior High School Students

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**Abstract:** The present study aimed to explore the impact pathway of digital reading willingness and behavior among junior high school students in Guangxi's developed urban areas, so as to improve the digital reading quality of teenagers. This study took students from key junior high schools in Nanning, Guilin, and Liuzhou as the research subjects. The UTAUT model retained three factors, performance expectation, effort expectation, and social impact, while introducing two variables, perceived risk and immersive experience, to jointly develop a factor model for the digital reading behavior of junior high school students in Guangxi. After conducting a questionnaire survey using an "online + offline" method, 497 valid questionnaires were obtained. SPSS 23 was used to perform reliability and validity analysis and descriptive statistical analysis, while AMOS 26.0 was used to conduct discriminant validity analysis, model adaptation analysis, hypothesis testing, and path analysis. The research conclusion was that performance expectations, effort expectations, social impact, and immersive experience all had a positive and significant impact on the digital reading willingness of junior high school students; performance expectations, effort expectations, social impact, and immersive experience positively influenced their digital reading behavior through their digital reading willingness, while perceived risk was found to have no significant impact on digital reading willingness and corresponding behavior. This article used a composite research method to study a sample of student groups in specific regions. It was an early introduction of immersive experience and perceived risk indicators in the study of digital reading behavior, specifically exploring the digital reading patterns of junior high school students who had

received less attention in previous studies but were in a critical period of growth.

**Keywords:** mobile learning; secondary education; informal learning; learning strategies

## 1 Introduction

At present, digital reading resources, including digital devices, are gradually becoming more popular, which has changed people's reading style to some extent, with the proportion of teenagers in the digital reading group increasing year by year. Digital reading can not only meet the curiosity and information needs of most teenagers, but also improve their self-learning ability and solve various problems. However, in the digital environment, teenagers are particularly required to have high digital literacy. The First Youth Internet Conference was held to release a survey report on youth's Internet literacy, which showed that the overall average score of teenagers' network literacy was 3.56, only slightly higher the passing line (3 out of 5) (China Economic Net 2022). Especially in junior high school, a key period for teenagers' growth, the quality of digital reading is not only related to the improvement of personal knowledge and healthy growth, but also to the sustainable development of society. At the same time, as a place where ethnic minorities have lived for generations, Guangxi has a prominent phenomenon of digital divide, which is affected by geographical location, economy, culture, society, and other factors. Moreover, the digital reading quality of junior high school students in Guangxi's urban areas is quite different from that of other regions at the same level, and there is very little relevant research literature. Based on these factors, in order to fully explore and verify the status and influencing factors of digital reading behavior of junior high school students in urban Guangxi, this study selected junior high school students in urban areas of Nanning, Guilin and Liuzhou, which have a wide coverage of digital technology and relatively high levels of economy, culture, education, and popularity of digital reading behavior among junior high school students, as the research objects. As the sample source of this study, key junior high schools referred to those under the jurisdiction of the municipal or provincial educational administrative institutions and having

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better teaching resources (Pang 2016). It was expected to further verify and unearth the influence path of digital reading willingness and behavior by selecting and using the sample of teenagers who are 12/13 to 15/16 years of age in Chinese junior high schools with unique locations and less attention (Sun 2019), so as to help junior high school students improve their digital literacy, narrow the digital divide, and promote social information equity through more comprehensive and three-dimensional cognitive enlightenment to relevant groups.

## 2 Research Review

### 2.1 Research Overview

At present, the relevant research results mainly include the following five sub topics.

#### 2.1.1 Definition of Digital Reading

Due to different research purposes and perspectives, relevant researchers have differentiated the definition of digital reading. From the reading perspective, Yu (2019) defined digital reading as browsing, absorbing, inferring, organizing, understanding, and evaluating various forms of text to improve one's skills, all presented in the form of digital media, which emphasizes the digitization of reading content as a medium. Li (2020) found from the digital perspective that digital reading required a certain level of digital reading literacy, including how to efficiently and accurately retrieve information, how to identify the quality of information, whether to analyze and utilize information, and the ability to produce information.<sup>[19]</sup>

#### 2.1.2 Junior High School Students' Motivation to Choose Digital Reading

Under the condition of technology development and wide application, digital reading has become a new trend of reading. The basis of junior high school students' choice of paper or digital reading has also been heavily researched by scholars. Li and Wu (2017) took WeChat reading as an example to explore Chinese teenagers' digital reading motivation, and found that different motivation dimensions had different effects on teenagers' social reading activities, with the motivation of killing time and self-development an important predictor of reading and social behavior. Loh, Ee, and Sun (2019) investigated the reasons why students in six

secondary schools in Singapore chose online reading, and found that these students chose digital reading to supplement reading resources that could not be found in the paper reading process. Jang and Henretty (2019) analyzed each prototype teenager with four reading attitudes: entertainment oriented pure digital readers, participative digital readers, participative print media readers, and digital preferred readers, and found that Sarah, an eighth grade student, became the digital preferred reader because she hoped to read short digital texts rather than long printed texts through social software such as Facebook. Nesi and Prinstein (2019) found that teenagers' choice of digital reading was to seek digital status on the one hand, namely, to get peer feedback through mutual likes, browsing, commenting, forwarding, sharing, and following in the process of digital reading, as well as to solve the problems they face offline. Junior high school students' digital reading motivation is closely related to their digital reading behavior, so in-depth study of junior high school students' digital reading motivation is helpful to explore the reasons behind junior high school students' digital reading behavior.

#### 2.1.3 Junior High School Students' Digital Reading Media Preferences

Scholars from various parts of the world have been paying attention to teenagers' reading media preferences. For example, Rutherford et al. (2018) studied whether digital devices affected the choice of leisure reading styles of Australian teenagers and found that people overestimated teenagers' views of e-books. Loh, Ee, and Sun (2019) found that Singapore teenagers' preference for reading media was affected by age, and they preferred print media in their adolescence. Borisenko et al. (2020) used questionnaires, structured interviews, and other methods to investigate 1,835 students in grades 5–8 in 14 regions of Russia, and found that most students still preferred paper reading. Relevant research results show that most teenagers still adhere to paper reading when reading, but based on the rapid development and development trend of digital reading in essence, it is imperative to carry out the research on teenagers' digital reading behavior.

#### 2.1.4 Factors Influencing Junior High School Students' Digital Reading Behavior

A large number of scholars have empirically concluded the factors that significantly affect junior high school students' digital reading behavior, such as social willingness, region, and family background. First, social willingness will affect

teenagers' digital reading efficiency. For example, Lee (2019) used a mixed research method of quantitative survey and focus group discussion to study the reading habits of 13–19-year-old teenagers, who cited that when reading online articles on social media or websites or keeping positive contact with friends on social media would distract them from reading. Li and Wu (2017) used the Unified Theory of Acceptance and Use of Technology (UTAUT) model and Value Added Model (VAM) to analyze the mediating effect of perceived value, for whether the user had the intention to use, whether the impact of perceived interest was far greater than that of perceived usefulness, and whether social impact can directly affect users' willingness to use, or indirectly affected their willingness to use through other mediations. Secondly, adolescents' location affects their digital reading behavior. Samsuddin et al. (2021) used the method of multi-stage mixed sampling to conduct a quantitative survey on 400 respondents from rural communities in four selected states in Malaysia, and found that although rural communities in low literacy areas in Malaysia carried out digital reading, the effect was not ideal. Thirdly, family background and information technology conditions also affect the digital reading level of secondary school students. Naumann and Sälzer (2017) investigated the digital reading ability of 15-year-old secondary school students in Germany and found that the level of digital reading was related to students' background (gender, immigration status, socioeconomic status), the availability of ICT (Information and Communication Technology), the use of Information and ICT, and their attitudes towards ICT. Zhang (2021) found that the influencing factors of teenagers' digital reading could be summarized as reading efficiency, reading environment, and reading motivation. From the sub topic review, we can see that the factors affecting junior high school students' digital reading behavior are diversified, and the influencing factors of junior high school students' digital reading behavior in different countries and regions are also different.

### 2.1.5 Research on the Problems and Countermeasures of Teenagers' Digital Reading

There is no doubt that digital reading brings great convenience to teenagers' reading, but at the same time, its negative effects cannot be avoided and should not be avoided. Liu (2015) pointed out that teenagers lacked the correct guidance of family, school, and society in the process of digital reading, and reading was more utilitarian. Zhang et al. (2022) found that in the face of the crisis of digital reading, it was necessary to strengthen the top-level design of digital reading, attach importance to the empirical

research of digital reading, and innovate the promotion path of teenagers' digital reading.<sup>[53]</sup>

## 2.2 Research Summary and Evaluation

Through the above review, it is found that the current research on this topic has achieved fruitful interdisciplinary results, but there are still the following problems: 1) the interdisciplinary research in some countries and regions is not sufficiently multidimensional, and the research perspective is relatively narrow; at the same time, based on the differences in the theoretical framework, discipline basis, and research paradigm of different disciplines, the interdisciplinary research on this subject has not been unified and standardized, resulting in a broad consensus on the connotation and extension of digital reading; 2) the research on this topic shows a diversified, scientific, and empirical trend in methodology, but this process has not been finally completed, especially in developing countries; and 3) the content granularity and research object specificity of many relevant studies are not sufficient. Some countries and regions pay special attention to the risk points and hazards of digital reading, and pay more attention to how to prevent and solve many problems than industries, services, and research progress; at the same time, compared with groups such as college students, there is less research on digital reading of junior high school students, and research on teenagers in ethnic minority areas in western China is even rarer, with less research on individual key variables found.

The international academic community including China has been committed to supporting the nationwide reading work in ethnic minority areas, especially focusing on the reading quality and information fairness of minors in ethnic minority areas. Therefore, this study focuses on the youth groups in junior high schools in Chinese ethnic minority areas and reflects and verifies the practical problems in the digital reading of specific age groups on the basis of scientific theory. Guangxi, which is located in the southwest frontier, is the autonomous region with the largest minority population in China, and it is a typical frontier ethnic region in China where the author's team can easily obtain sample data. Therefore, this article takes the junior high school students in urban Guangxi as the research object, uses the empirical research paradigm to analyze the internal and external factors affecting the digital reading of junior high school students in urban Guangxi as the research object, uses the empirical research paradigms to analyze the internal and external factors affecting the digital reading of

junior high school students in three urban areas of Guangxi, and constructs a localized and situational junior high school students' digital reading behavior model on the basis of UTAUT model, in order to inspire and enlighten academic colleagues to pay attention to exploring the more comprehensive and diversified influencing factors of local teenagers' high-quality digital reading. It also provides reference for the development of the youth related groups in the less developed and even medium development level areas in the world, and their digital reading industries and careers.

### 3 Variable Definition and Hypothesis, Research Methodology

#### 3.1 Definition of Variables and Proposition of Assumptions: Relevant Basic Theoretical Models

Davis and Davis (1989) proposed the Technology Acceptance Model (TAM), which evolved from the theoretical model of rational behavior, and found that the actual use of technology by individuals depended on their behavioral willingness, which was determined by perceived ease of use and perceived usefulness. However, the TAM model can only explain 40 % of the variance of the willingness to act. To further improve the explanatory power, Venkatesh et al. (2003) proposed the UTAUT model based on previous studies of the integrated technology acceptance and use model, with the explanatory power of this model on willingness to act as high as 70 %. The UTAUT model has four core and

moderating variables. According to the existing literature, performance expectation comes from useful cognition, motivation and purpose, self-efficacy, etc.; effort expectation comes from the cognition of ease of use, complexity, etc.; social influence originates from subjective norms, social conditions, etc.; and convenient conditions arise from perceived behavior control, enabling conditions, etc. (Deng et al. 2022). This model can be seen in Figure 1.

The model shows that the four core variables all directly and indirectly affect the usage behavior, convenient conditions directly affects the usage behavior, convenient conditions directly affect the usage behavior, while performance expectation, effort expectation, and social influence indirectly affect the usage behavior through the mediating variable of usage intention. The four moderating variables also exert influence on the four core variables. The variables and assumptions of this study are fully referred to these two theoretical models.

#### 3.2 Definition of Independent Variables and Research Hypotheses

##### 3.2.1 Performance Expectation

Performance expectation is an independent variable of UTAUT model, which refers to the degree to which individuals can use information technology to improve job performance or specific abilities. Deng et al. (2022) and Niu, Wu, and Sha (2022) all identified a direct and significant impact on the willingness and behavior of technology utilization. Kim, Chan, and Gupta (2007) proposed the theory of perceived value model in the context of mobile Internet,

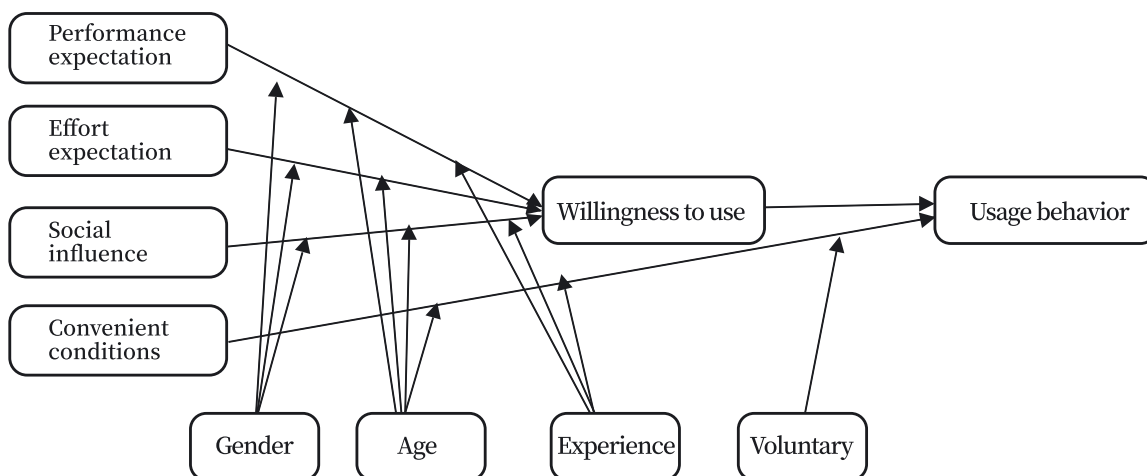


Figure 1: Unified theory of acceptance and use of technology.

with the conclusion that perceived value was the decisive factor to determine whether users adopted mobile Internet or not, with other factors needed to indirectly affect users' willingness and behavior through perceived value. Hsiao and Chen (2017) and Li, Hu, and Ji (2018) also pointed out that perceived value had a positive impact on users' e-book subscription or client use intention, and concluded that when readers perceived that digital reading had great advantages, they would have a strong willingness to read and take action accordingly, with this intensity the performance expectation of digital reading. It can thus be assumed that:

H1: Performance expectation has a positive impact on the digital reading willingness of junior high school students in urban Guangxi.

### 3.2.2 Effort Expectation

Li et al. (2023) studied whether Chinese users continued to accept mobile medicine in multiple scenarios, and found that effort expectation could promote user acceptance behavior. Xu, Lan, and Wang (2022) studied the influencing factors that prompted micro-blog users to forward relevant information when emergencies occurred, and found that the difficulty of forwarding behavior positively affected forwarding behavior. Chen, Li, and Chen (2020) found that the process of e-book system operation (including annotation, highlighting, commenting, and other activities) could not only strengthen users' sense of control, but also enable them to experience a higher level of immersion. The definition of effort expectation in this article is the degree of effort required to acquire digital resources using digital devices in the process of digital reading. Generally, the higher the effort expectation of digital reading devices, the stronger the willingness to carry out digital reading. It can thus be assumed that:

H2: Effort expectation positively affects the digital reading willingness of junior high school students in urban Guangxi.

### 3.2.3 Social Influence

In the UTAUT model, social influence refers to whether individuals' willingness to use information technology will be affected by society or groups. It can be divided into the influence of public opinion, the influence of social circles, the influence of social media, etc., with this study only involving the influence of interpersonal relationships in society on junior high school students' digital reading behavior. When Davis and Davis (1989) proposed the

technology acceptance model, they emphasized the role of social influence on users' acceptance of information technology. Li and Gu (2021) found that the social influence factor (community influence) could reduce the withdrawal psychology of junior high school teachers and improve their acceptance of AI (Artificial Intelligence) education. Liu, Li, and Wang (2020) studied the tendency of users to use online office apps, and concluded that social influence and social trends prompted most users to use these. Social impact in this study referred to whether individuals were willing to use information technology under the influence of society or groups. It can thus be assumed that:

H3: Social influence has a positive impact on Guangxi junior high school students' digital reading willingness.

### 3.2.4 Perceived Risk

Taylor (1974) found that perceived risk was that a consumer's behavior would produce possible loss, including in psycho/social or functional/economic terms, while Dowling and Staelin (1994) defined it as that an individual can predict that a behavior may bring harmful and uncertain results. Based on the existing literature, this study defines perceived risk as the degree to which readers can perceive their own cognitive imbalance, physical/psychological damage, and other harmful results caused by information pollution, excessive use of digital devices, and excessive addiction. When studying the types of perceived risk, Jacob and Kaplan (1972) divided it into five dimensions: physical, psychological, economic, functional, and social risk, however, Featherman and Pavlou (2003) detailed that perceived risk had six dimensions, namely economic, functional, psychological, social, privacy, and time risk, when studying consumers' acceptance of electronic services. At present, there are studies in the academic community that have confirmed that perceived risk will affect the use intention and behavior of individuals. Chen, Li, and Fu (2019) studied whether passengers accepted bus driverless driving, and concluded that the main reason for this was whether driverless driving will bring risks; the higher the risk, the weaker the willingness to accept. Hu and Zhang (2019) studied the influencing factors of hindering college students' use of a health app, and found that the potential risks of health app would inhibit their use of it. Therefore, this study defined perceived risk as the risk of time, body, privacy, and other risks that digital reading may bring during the process of digital reading. It can thus be assumed that:

H4: Perceived risk negatively affects the digital reading willingness of junior high school students in urban Guangxi.

### 3.2.5 Immersive Experience

At present, the research on the relationship between immersion experience and behavioral intention is in the ascendant. Lu, Li, and Wang (2016) found that individuals with positive emotions were more confident, optimistic, and unrestrained in reading e-books, and could be more active online, while some other students were not active in social behavior due to the reading form and were more inclined to the individual immersion experience due to the influence of traditional paper reading; when reading e-books (electronic books), they might think that the social interaction functions such as comments and group discussions on the platform had no obvious benefits or special interference on reading. Liu, Wang, and Zhang (2022) studied the influencing factors of information interaction behavior between users and anchors in the process of live delivery and found that immersion experience could promote information interaction between the two sides. Chen, Li, and Chen (2020) studied whether the immersion experience of microblog users significantly affected their continuous usage behavior, and found that the immersion experience can be used as a moderator to promote users' continuous use of microblogs. Wang and Li (2022) conducted an experimental study based on the differences between paper and electronic reading, investigated the differences of different carriers in reading speed, memory effect, perceptual learning, and other aspects, and introduced the dimension of reading immersion to explain how the carriers affected the reading comprehension effect. According to the relevant results, this study defines immersion experience as the complete concentration of attention during digital reading, which can shield all irrelevant thoughts and perceptions, and make the individual completely immersed to achieve a pleasant state. It can thus be assumed that:

H5: Immersion experience has a positive impact on the digital reading willingness of junior high school students in urban Guangxi.

### 3.3 Definition of Mediating Variable and Research Hypothesis

Behavioral intention refers to the mediating variable in the influencing factor model of individual digital reading behavior, which can directly affect reading behavior. Yueh, Huang, and Chang (2015) pointed out that behavior intention was the basis or possibility for individuals to measure whether they will take a specific behavior in the future. Qi and Deng (2010) found that users' willingness to use an interactive question and answer service would promote

their actual use of the interactive question and answer service when studying users' acceptance of such a service. Hong, Zhang, and Zhang (2021) also found similar findings when studying tourists' willingness and behavior to use the Airbnb platform. Based on the above results, this study finds that behavioral intention, that is, the tendency or possibility of individual digital reading, is an indicator to measure digital reading behavior. Therefore, the following assumption is put forward:

H6: The digital reading intention of junior high school students in urban Guangxi has a positive impact on their actual digital reading behavior.

### 3.4 Definition of Dependent Variable: Digital Reading Behavior

As the dependent variable in the influencing factor model of digital reading behavior, digital reading behavior is directly determined by the willingness of digital reading behavior, and is indirectly determined by performance expectation, effort expectation, social influence, perceived risk, and immersion experience. Fishbein and Ajzen (1975) put forward the theory of rational behavior, which pointed out that people's behavior was mainly affected by their behavior intention, which was jointly determined by their behavior attitude and subjective norms. In this study, digital reading behavior referred to the behavior of individuals using digital devices to obtain digital resources and their reading being driven by digital reading intention. The measurement of this variable was adapted from the scale in the work of Fishbein and Ajzen (1975): see Table 1 for details.

### 3.5 Research Tools

#### 3.5.1 Questionnaire Composition

The first part of the questionnaire asked about junior high school students' demographic characteristics, and basic reading status but, due to the limited space, this article does not cover relevant descriptive research. The second part measured and verified the influencing factors of digital reading behavior of junior high school students in three cities of Guangxi, and the influence of willingness on actual behavior, that is, the impact of performance expectation, effort expectations social influence, perceived risk, immersion experience, and digital reading willingness on the actual behavior of digital reading. Combined with the interview results of a small number of junior high school students, it is known that they have not only

**Table 1:** Specific measurement items of variables of behavior impact model.

Influence factor	Measurement items	Measure specific issues	References
Performance expectation (PE)	PE1	Rich digital reading content has helped me gain knowledge	Venkatesh et al. (2003)
	PE2	Digital reading can help me solve the problems I encounter in life and study	
	PE3	Digital reading allows me to access the latest information	
	PE4	Digital reading can meet my needs for various types of information	
Effort expectation (EE)	EE1	Proficient use of digital devices is easy for me	Venkatesh et al. (2003); Zeng (2019)
	EE2	Digital devices make reading lighter and more convenient	
	EE3	Obtaining reading content through digital devices is simple	
	EE4	Digital reading content with animation, images, and sound makes it easier for me to understand the reading content	
Social influence (SI)	SI1	My parents' opinions have an impact on my ability to read numbers	Venkatesh et al. (2003)
	SI2	The teacher's opinion has an impact on my ability to read numbers	
	SI3	My classmates' reading preferences have an impact on my ability to read numbers	
Perceived risk (PR)	PR1	Frequent digital reading can have an impact on my body (vision, lumbar spine, etc.)	Liu (2013); Niu, Zhang, and Huang (2020)
	PR2	I am worried that digital reading may unconsciously waste time	
	PR3	I am worried that digital reading may reveal personal information, leading to frequent push notifications of useless information	
Flow experience (FE)	FE1	When reading numbers, it always brings me a lot of fun	Hoffman and Novak (1996)
	FE2	When reading numbers, it always makes me feel like time flies by so fast	
	FE3	When reading numbers, it always makes me concentrate and even forget myself	
Intention of the user (IU)	IU1	I am still willing to continue reading numbers in the future	Wen (2014)
	IU2	I will often engage in digital reading in the future	
	IU3	In the future, I will try my best to read as many numbers as possible	
	IU4	In the future, I will recommend digital reading to others	
Usage behavior (UB)	UB1	I have read numbers before	Fishbein and Ajzen (1975)
	UB2	I proactively engage in digital reading	
	UB3	I often engage in digital reading	

perceived physical and psychological risks but also privacy and time risks, which is also consistent with the existing research, so the items measuring perceived privacy and time risks are added to the scale. The second part of the questionnaire is the Likert five scale, with the options corresponding to highly disagree, disagree, general, agree, and highly agree.

### 3.5.2 Design of Measurement Items of Variables in Behavior Impact Model

This study retains three variables that affect behavior in the UTAUT model: performance expectation, effort expectation, and social influence. The design of these measurement items is mainly based on the research of Venkatesh et al. (2003), Zeng (2019), and other researchers, combined with the characteristics of digital reading of junior high school

students in the three urban areas of Guangxi. See Table 1 for specific questions:

In addition, the model adds two potential variables of perceived risk and immersion experience. The specific measurement items of perceived risk were adapted from the research questionnaires of Liu (2013) and Niu, Zhang, and Huang (2020). The specific measurement issues of immersion experience potential variables were adapted from the research of Hoffman and Novak (1996): see Table 1 for the specific measurement items.

Finally, the outcome variables include digital reading intention and digital reading behavior. The measurement of digital reading intention was adapted from the scale in the study of Wen (2014), and the measurement of digital reading behavior was adapted from the scale in the study of Fishbein and Ajzen (1975). See Table 1 for specific measurement problems.

### 3.6 Research Methods, Interviewed Samples, and Research Process

#### 3.6.1 Research Methods

This study mainly adopts three methods: interview, questionnaire survey, and statistical analysis.

#### 3.6.2 Investigation Process and Results of Interview Method

The interview research method is a preceding method to determine potential variables and build models. This study first explains its research process and results. The main purpose of this interview is to find out the basic situation of digital reading of the sample of junior high school students in the three urban areas of Guangxi, and to improve the rationality of the selection of influencing factors and the construction of the model. Under the condition of epidemic control in China, the interview is mainly one-to-one telephone interviews. During the interviews, the interviewees are constantly helped to understand the measurement problems so they can express their true views.

The interview was completed from early October 2022 to the end of November 2022. The respondents were four junior high school students per key junior high school in three cities of Guangxi respectively. The interview lasted 15–20 min and included two parts: 1) the basic situation of digital reading of junior high school students in urban Guangxi; and 2) the promotion or restriction of their digital reading behavior. See Table 1 for related variables such as performance expectation, effort expectation, social influence, etc.

The interview results are as follows: all 12 junior high school students interviewed had digital reading behavior; the digital reading of the 12 respondents was mainly mobile phone or computer reading, usually in the form of video or text reading books of interest; three respondents said they preferred paper reading, and nine respondents preferred digital reading because of its convenience and rich content. In terms of performance expectation, one of the influencing factors of digital reading, all 12 respondents expressed that digital reading to some extent helped their learning and life, that is, performance expectation could improve their willingness to read digitally; with regard to effort expectation, 12 respondents said that it was not difficult for them to learn how to use digital devices and obtain information through digital devices; regarding social influence, three respondents said whether they read digitally was not affected by the people around them, while nine respondents indicated that suggestions from people around them would promote their

digital reading; regarding perceived risk, most respondents stated they had not considered or did not believe that digital reading would affect their health or cause privacy disclosure; regarding immersion experience, 10 respondents said that the rich content and diverse forms of digital reading allow them to better enjoy the pleasure of reading. On the basis of the interview results, a questionnaire survey with a certain sample size was carried out.

#### 3.6.3 Questionnaire Survey and Statistical Analysis

This study draws on authoritative and classic questionnaires from existing research and fine-tunes the questionnaire based on the digital reading situation of junior high school students in three urban areas of Guangxi. The variable indicators in the research questions are transformed into quantifiable and operable questions, and the survey is conducted through online and offline questionnaires. A small-scale preliminary survey was conducted first, followed by the analysis of reliability and validity of the questionnaire to verify its rationality and scientificity. The formal questionnaire was then finalized and distributed on a large scale to collect data.

The statistical analysis method is applied to construct the influencing factors model of junior high school students' digital reading. After collecting the required data, Statistical Package for the Social Sciences (SPSS) 23.0 is used to carry out descriptive statistical analysis and reliability and validity analysis on the valid sample data, and Analysis of Moment Structure (AMOS) 26.0 is used to carry out model validation, convergent validity analysis, discriminant validity analysis, and model correction analysis of whether the research hypothesis is true or not, and analysis of the influence direction and intensity of each variable.

#### 3.6.4 Officially Interviewed Sample

In the formal survey, there were 271 girls and 226 boys. The sample number of junior high school students was the largest, but the sample number of grades and gender was generally balanced (see Table 2).

### 3.7 Research Process

#### 3.7.1 Questionnaire Pretest

The pre-test is a small-scale survey conducted offline to test the initial reliability and validity of the questionnaire. The pre-test data of this questionnaire are from the junior high school students of grade 1 to grade 3 in a key junior high

**Table 2:** Structure of survey samples.

Measurement items			Grade			Total
			First grade of junior high school	Second grade of junior high school	Third grade of junior high school	
Gender	Female	Count	73	90	108	271
		% of total	14.7 %	18.1 %	21.7 %	55.5 %
	Male	Count	71	74	81	226
		% of total	14.3 %	14.9 %	16.3 %	45.5 %
Total		Count	144	164	189	497
		% of total	29 %	33.0 %	38.0 %	100 %

school outside the urban area of Guangxi. A total of 153 questionnaires were collected, with 21 invalid questionnaires caused by factors such as convergence of answers, contradiction of answers, and omission of answers, while too short or too long answer times were also eliminated, leaving 132 valid questionnaires. The internal reliability of the pre-test questionnaire was measured by Cronbach’s  $\alpha$  coefficient, which for the total questionnaire was 0.916, which proved that the internal reliability of the questionnaire was very good. In terms of validity analysis, the significance of Bartlett ball test was 0.000, and the Kaiser-Meyer-Olkin (KMO) test value was 0.885. In this case, factor analysis explained 79.878 % of the total variance.

**3.7.2 Formal Questionnaire Survey**

The formal questionnaire survey combines the online questionnaire issued by the class group with the offline paper questionnaire. The distribution time is from December 1 to 30, 2022, lasting for 30 days. Considering the coverage rate of digital technology and the comprehensive performance of junior high school students in key junior high schools, the respondents were determined as grade one, grade two, and grade three students in key junior high schools in Nanning, Guilin, and Liuzhou respectively. A total of 550 formal questionnaires were distributed, with 539 recovered and 42 invalid questionnaires similar to the above reasons being eliminated. Finally, 497 valid questionnaires were obtained. Their data were sorted and entered into SPSS software and checked to analyze the data.

**3.7.3 Reliability and Validity Analysis of Formal Questionnaire Survey**

The reliability of 22 items in the questionnaire was analyzed by SPSS 23.0. and the Cronbach’s  $\alpha$  coefficient was 0.889, indicating that the questionnaire has high reliability and

reliability. The results of validity analysis showed that KMO was 0.878, which was greater than its standard value of 0.7, and the significance statistical value of Bartlett ball test was 0.000, which was less than the specified standard value of 0.05, indicating that the measurement items had high correlation and high validity.

**4 Research Findings**

**4.1 Structural Equation Modeling**

There are seven potential variables and 22 observation variables in the digital reading behavior model of junior high school students in urban Guangxi. The independent variables include PE, EE, SI, PR, and FE; the mediating variable is IU; the dependent variable is UB. PE, EE, SI, PR, and FE directly affect junior high school students’ IU, and junior high school students’ IU directly affects UB. By carrying out the structural equation model fitness analysis, the fitness value of the initially constructed model is obtained, and the numerical value shows that the fitness of the original model has reached a good level.

**4.2 Structural Equation Model Modification**

Although the data showed that the initial model fit index was at a good level, the error between e19 and e22 was as high as 29.364. Error variable e19 is the error variable of digital reading willingness iu1, that is, “frequent digital reading,” and e22 is the error variable of digital reading behavior UB3, that is, “frequent digital reading.” There is a high correlation between digital reading willingness and digital reading behavior. Therefore, an association can be established between e19 and e22. The modified model is shown in Figure 2:

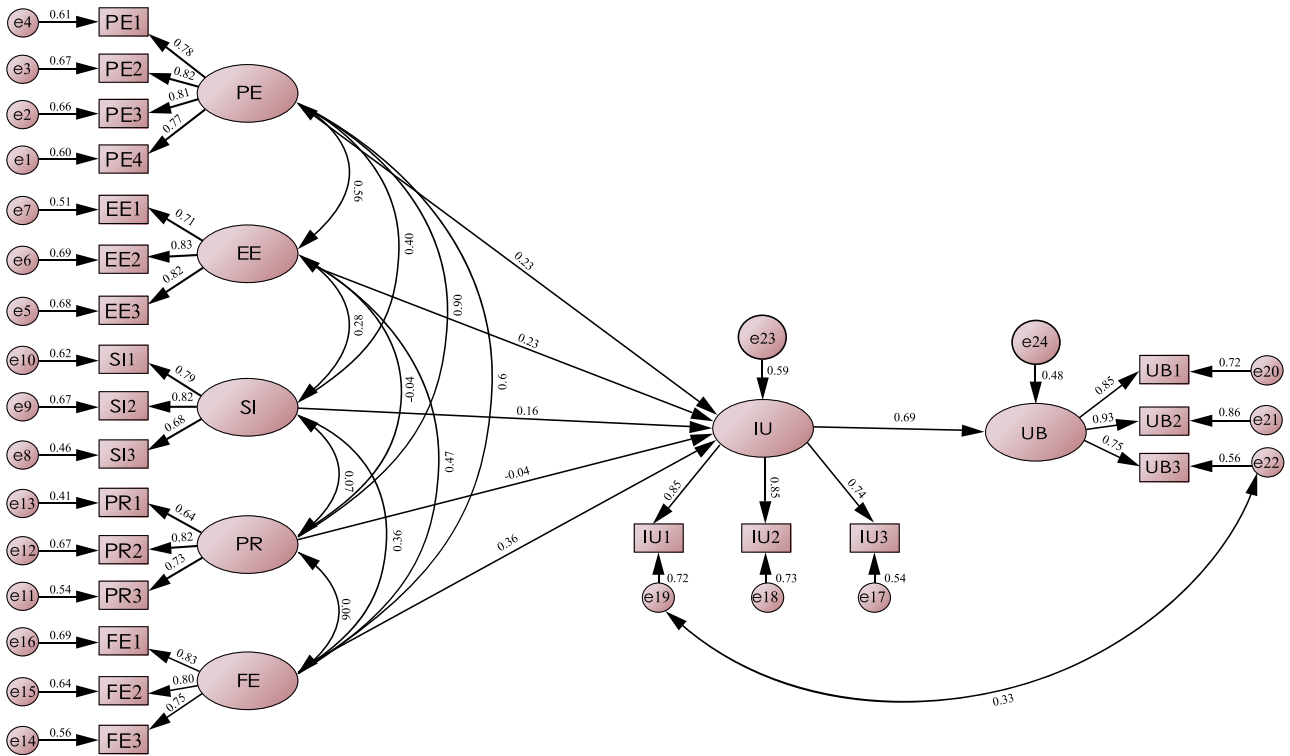


Figure 2: Modified structural equation model.

Most of the evaluation indexes of the modified structural equation model changed (see Table 3). The CMIN/DF (Chi-square/Degrees of Freedom) value in the table decreased from 2.891 to 2.736, and the RMESA (Root Mean Square Error if Approximation) value decreased from 0.062 to 0.059, while the Goodness of Fit Index (GFI), Adjusted Goodness of Fit Index (AGFI), Incremental Fit Index (IFI), Comparative

Fitness Index (CFI), and Normed Fit Index (NFI) were slightly higher than those before the correction. In addition, the adjusted RMR (Root Mean Square Residual) and PNFI (Parsimonious Normed Fit Index) values remained unchanged. It is thus clear that the correction process has improved the structural equation model and improved its acceptability to a certain extent.

Table 3: Evaluation index of overall fitness of modified structural equation model.

	Model evaluation indicators	Evaluation criterion	Good	Reasonable	The evaluation index values of this research model	Evaluation results
Absolute fit index	CMIN/DF		[1,3]		2.736	Reasonable
	GIF	>0.9		>0.8	0.910	Good
	AGFI	>0.9		>0.8	0.881	Reasonable
	RMSEA	<0.05		<0.08	0.059	Reasonable
	RMR			<0.05	0.033	Good
Value added fitness index	TLI	>0.9		>0.8	0.931	Good
	CFI	>0.9		>0.8	0.943	Good
	NFI	>0.9		>0.8	0.914	Good
	IFI	>0.9		>0.8	0.943	Good
	RFI	>0.9		>0.8	0.896	Reasonable
Minimalist fit index	PNFI			>0.5	0.759	Good
	PCFI			>0.5	0.784	Good

### 4.3 Hypothesis Testing of Structural Equation Model

A total of 497 valid sample data were imported into the structural equation model built with AMOS 26.0 software. After correlation analysis, the non-standardized regression coefficient and non-standardized model of the structural equation model of the influencing factors of digital reading behavior were obtained. For the regression coefficient of the non-standardized structural equation model, if the P value is less than 0.05, the result is significant, which means that the research hypothesis is valid. The results show that H1, H2, H3, H4, and H5 are all true, but H6 is not true.

#### 4.3.1 PE has a Significant Positive Impact on IU of Junior High School Students in Urban Areas

The regression coefficient between performance expectations and digital reading willingness of junior high school students in urban Guangxi is 0.258, and the critical ratio is 3.903, which is greater than 1.96, reaching a significant level, which means that junior high school students in urban areas of Guangxi feel that digital reading advantages can help them solve their learning and life problems to a certain extent, can obtain new information in a timely manner while meeting their own information needs, and can broaden their horizons. When they feel this advantage more strongly, they are more willing to carry out digital reading. The verification of this hypothesis coincided with Nesi and Prinstein (2019)'s conclusion that teenagers' digital reading was based on digital status and solving offline problems mentioned above, and in different situations, the studies of Lee (2019), Venkatesh et al. (2003), Li (2017), and Zhang (2021) on different samples also fully supported the verified hypothesis in different situations. The validation process and literature support of this study show that the performance expectations of digital reading users, including junior high school students, that is, the satisfaction of utilitarian actual needs, always significantly affect their digital reading willingness. On the contrary, if the actual needs weaken and disappear, it will weaken the rationality and inevitability of the generation of digital reading willingness.

#### 4.3.2 EE Significantly Positively Affects IU of Junior High School Students in Urban Areas

The regression coefficient between effort expectation and digital reading intention of junior high school students in urban Guangxi is 0.246, and the critical value is 4.564,

reaching the significance level of 0.001, so the hypothesis is tenable. The fifty-first Statistical Report on China's Internet Development showed that China's digital device users tended to be younger (Tang 2023); as digital natives, it is also very easy for most junior high school students in urban Guangxi to use digital devices, and relevant courses in school can further improve their digital reading literacy, so junior high school students in urban Guangxi will prefer digital reading to traditional reading when conditions permit this choice. The verification of this hypothesis supported the conclusions of Naumann and Sälzer (2017), Davis and Davis (1989), and Venkatesh et al. (2003) mentioned above. It showed that the higher the effort expectation of junior high school students' digital reading, the simpler the relevant operation and process, the stronger their digital reading willingness, that is, the effort expectation provided subjective conditions and realistic possibilities for users to carry out digital reading, so, as a necessary link, it has been confirmed by relevant research.

#### 4.3.3 SI Significance has a Positive Impact on IU of Urban Junior High School Students

The regression coefficient of social impact on the digital reading intention of junior high school students in urban Guangxi was 0.177, with a critical ratio of 3.524, reaching a significant level of 0.001. Parents, schools, businesses, libraries, and other sectors of society provide junior high school students with digital reading equipment and create a good digital reading environment, and the network's extracurricular reading materials recommended by the school, the promotion of digital reading in the library, and students' preference for digital reading will expand and strengthen junior high school students' preference for digital reading forms. The verification of this hypothesis was completely consistent with the conclusions reached by Li (2017), Naumann and Sälzer (2017), and Zhang (2021) mentioned above. Junior high school students' digital reading willingness is greatly affected by the social support system, which can obviously be included in the category of common sense or social learning and cognitive classical theory; junior high school students are the product of the environment, with their digital reading intention generally positively influenced and restricted by the views of the main social stakeholders.

#### 4.3.4 PR has no Significant Impact on IU of Urban Junior High School Students

The regression coefficient of perceived risk on digital reading intention of junior high school students in urban

Guangxi was -0.038, and the p value of 0.273 did not reach the significant level of 0.05, indicating that perceived risk had no significant effect on digital reading intention. From the descriptive statistical analysis results of the first part of the questionnaire, it is obvious that most junior high school students in urban Guangxi carry out digital reading during holidays or after school, and most junior high school students' digital reading time is 30 min to 1 h. They do not feel that this will waste time or have a serious impact on their bodies; in addition, due to the junior high school students' age and limited popularity of the personal privacy and security knowledge, most of them do not pay enough attention to privacy and security, and do not have a clear understanding of the potential risks of privacy disclosure, so they do not have a strong awareness of personal information protection in digital reading. Therefore, junior high school students in urban Guangxi do not believe that the potential risks in digital reading will affect their digital reading willingness. Previous studies on digital reading willingness and behavior have reported that the impact of perceived risk significance and non-significance is roughly divided into half and half. Studies that found that PR has a significant negative impact include that of Xie (2020) who found that college students' PR has an impact on WeChat reading IU, and that of Chang et al. (2023) who found that PR has an impact on IU in college students' digital academic reading behavior, however, Su (2011) found that perceived risk had no significant impact on the willingness and satisfaction of continuous use of mobile reading and Wang, Li, and Chen (2014) found that perceived risk had no significant impact on college students' digital reading willingness. Based on the above research, PR in digital reading may be a health factor, that is, when it reaches a certain level, users' attention will no longer increase, but if the security is very low, it will seriously affect users' digital reading attitude. The non-significant results of this study may come from the weak digital risk awareness or the unique digital security concept of junior high school students in Guangxi.

#### 4.3.5 FE Significantly Positively Affects the IU of Junior High School Students in Urban Areas

The regression coefficient of immersion experience on the digital reading intention of junior high school students in urban Guangxi is 0.366, and the critical ratio is 6.36, reaching a significant level of 0.001. The hypothesis is tenable. Immersion experience is the psychological pleasure perception brought about by behavior, with junior high school students in urban Guangxi feeling pleasure because of digital reading content and its presentation. They are familiar with digital reading equipment and can adapt to the digital

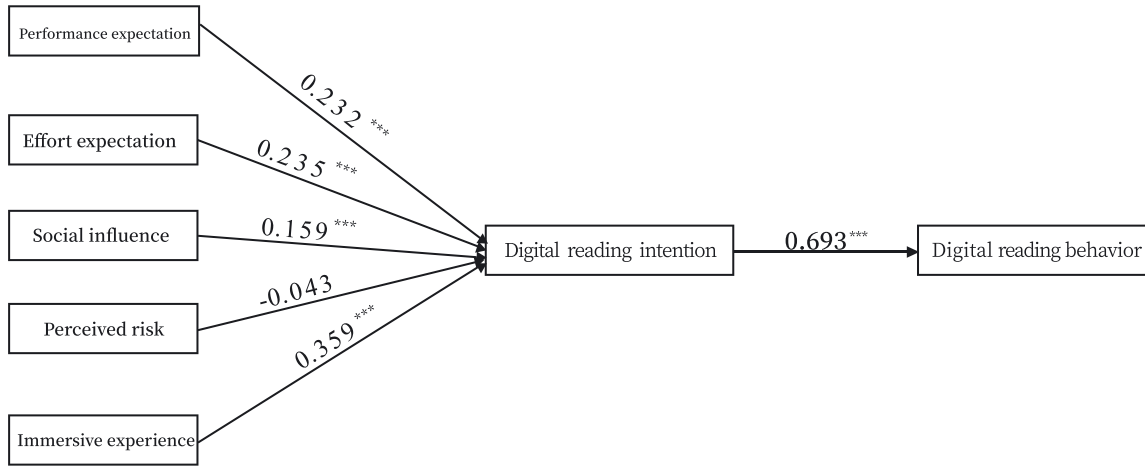
environment, so their skills and challenges can be adapted and they will not be bored. The combination of the two will enhance junior high school students' desire for digital reading, that is, junior high school students' immersion experience is in direct proportion to their digital reading willingness. The above-mentioned empirical studies of Liu, Wang, and Zhang (2022), Wang and Li (2022), and Ma and Su (2020) have all concluded that immersion experience significantly affected digital reading behavior and its effect. It was thus clear that the above studies have concluded the positive impact of EF. The hypothesis verified by this study further proves the importance of FE to this group and its corresponding behavior by using the sample of junior high school students in Guangxi, so as to provide a new basis for the confirmation of this relationship in the Chinese context. It is also expected to enlighten the academic community and relevant service providers to focus on teenagers' experience, perception, and even literacy, and ensure multi-party satisfaction to achieve win-win results.

#### 4.3.6 IU Significance of Urban Junior High School Students has a Positive Impact on UB

The regression coefficient of Guangxi urban junior high school students' digital reading intention on their digital reading behavior was 0.629, and the critical value was 12.765, reaching the significant level of 0.001. Behavior depends on personal will. When junior high school students' willingness to read numbers is stronger, they will naturally take action. The verification of this hypothesis was in the same direction as the influence path of Yueh, Huang, and Chang (2015), Hong, Zhang, and Zhang (2021), and Qi and Deng (2010) mentioned above; this verification process showed that in multiple situations, the stronger the digital reading willingness of different subjects, the more likely they were to carry out digital reading behavior or have a higher degree of involvement in related behavior. This research result can also be linked with the general knowledge of the relationship between behavior and thinking and, at the same time, showed that most people's digital reading behavior has its underlying rational factors and logical inevitability, which were directly affected by the willingness of digital reading to a large extent.

#### 4.4 Path Analysis of Structural Equation Model

In path analysis, the total effect between variables is the sum of direct and indirect effects. The direct effect is the direct influence, and the indirect effect is the influence of the predictive



**Figure 3:** The influencing factor model of digital reading behavior of junior high school students in urban Guangxi and the path relationship between potential variables.

variable on the standard variable. The intensity of the indirect effect value is equal to the product of the path coefficients of all direct effects. The structural equation model and path relationship constructed in this study are as follows (see Figure 3):

**4.4.1 Direct Influence Effect Between Model Variables**

The path coefficient between variables is the regression coefficient value of the standard model. The path coefficients among PE, EE, SI, FE, and IU all reach a significant level of 0.001, while the PR path coefficient does not reach a significant level. From the direct impact path relationship between variables in Table 4, PE, EE, SI, and Fe all have a direct positive impact on IU, and IU also has a direct positive impact on UB. Referring to Figure 3 for the value of path coefficient, it shows that the four variables all affect junior high school students’ digital reading willingness to a certain extent, especially that variables such as immersion experience and effort expectation can affect their digital reading willingness

to the greatest extent, while the value of digital reading willingness can directly affect or even predict the occurrence and investment of behavior to a greater extent.

**4.4.2 Indirect Effect Between Model Variables**

PE, EE, SI, and FE have indirect effects on UB in the influencing factor model of digital reading behavior of junior high school students in urban Guangxi. The path coefficient of the indirect effect of performance expectation on digital reading behavior is 0.161; the indirect impact path coefficient of effort expectation on digital reading behavior is 0.163; the path coefficient of the indirect impact of social impact on digital reading behavior is 0.110; and the path coefficient of the indirect impact of immersion experience on digital reading behavior is 0.249. Since perceived risk has no impact on digital reading intention, the corresponding path coefficient is not calculated. According to the effect value, the influence intensity of the four potential variables on UB from large to small is immersion experience, effort expectation, performance expectation, and social impact.

**Table 4:** Numerical table of total effect path coefficient of the model.

Total effect	Path coefficient	Direct effect	Path coefficient	Indirect effects	Path coefficient
UB <-	0.393	IU <-	0.232	UB <-	0.161
PE		PE		IU <- PE	
UB <-	0.398	IU <-	0.235	UB <-	0.163
EE		EE		IU <- EE	
UB <-	0.269	IU <- SI	0.159	UB <-	0.110
SI				IU <- SI	
UB <-	0.608	IU <-	0.359	UB <-	0.249
FE		FE		IU <- FE	
UB <-	0.693	UB <-	0.693		
IU		IU			

**4.4.3 Total Effect Between Model Variables**

See Table 4 for the total effect path coefficient of the model. Based on these results, it is obvious that IU has the greatest impact on UB, followed by FE, while PE and EE have the same impact on UB, and SI has a relatively small impact on UB. To sum up, although PE, EE, SI, and FE are the antecedents of IU in the model, they also have a considerable impact on UB, and these results can influence the academia to pay more attention to the immersion experience that can play a greater role in digital reading behavior.

## 5 Discussion

By analyzing the influencing factors of junior high school students' digital reading in urban Guangxi, this article constructs the influencing factor model of junior high school students' digital reading behavior in order to draw attention to the digital reading behavior of junior high school students in China's western frontier minority areas and provide reference for understanding and reducing the digital divide. The model is based on the UTAUT theoretical model, retaining the three variables of performance expectation, effort expectation, and social impact, while adding two influencing factors of perceived risk and immersion experience. SPSS 23.0 and AMOS 26.0 are used to analyze and verify the new model to ensure its rationality. According to the model analysis and verification results, the main research conclusions are as follows:

Firstly, regarding the impact of performance expectations on junior high school students' digital reading behavior, the study finds that performance expectations directly and positively affect junior high school students' digital reading intention, and indirectly and positively affect digital reading behavior through the mediating effect of digital reading intention. Performance expectation in this study refers to whether digital reading can bring practical benefits, which belongs to the value-added item. Combined with the existing research, it can be seen that the realistic needs and utilitarian goals of junior high school students are always the important motivations of their digital reading, with this study providing a relatively new Guangxi junior high school students' data sample basis when verifying this proposition.

Secondly, regarding the influence of effort expectation on junior high school students' digital reading behavior, effort expectation directly and positively affects junior high school students' digital reading intention, and indirectly positively affects their behavior through the mediation of intention. For the reasons mentioned above, at present, even the junior high school students in the urban areas of China's border ethnic minority areas have been able to use digital devices with ease, and the natural advantages and self-confidence in the operation of this technology can promote their digital reading behavior.

Thirdly, regarding the influence of social influence on junior high school students' digital reading behavior, social influence directly and positively affects junior high school students' digital reading intention, and indirectly and positively affects their digital reading behavior through the mediating effect of digital reading intention. Junior high school students are at a special and critical stage of individual growth and they are influenced by their families,

friends, teachers, idols, and other important stakeholders in their lives. If these individuals recommend or agree with digital reading to junior high school students, they are likely to be greatly affected.

Fourthly, regarding the influence of perceived risk on junior high school students' digital reading behavior, perceived risk has no significant effect on junior high school students' digital reading intention, which is affected by their own health characteristics and may be the unique result of the Guangxi junior high school students' sample. Risk means that we estimate that there may be risks such as physical injury, waste of time, and disclosure of personal information during digital reading, but in fact individuals care little or not about it. On the one hand, this may be affected by the length of time junior high school students spend in digital reading and the lack of rich experience, while on the other hand, it may be that they, their families, and schools have weak awareness of digital risk and a strong sense of digital security, with their digital security outlook generally needing to be adjusted and improved.

Fifthly, regarding the influence of immersion experience on junior high school students' digital reading behavior, immersion experience has a direct and positive impact on junior high school students' digital reading intention, and has an indirect and positive impact on their digital reading behavior. This study uses the sample of junior high school students in Guangxi focused on earlier to obtain a significant impact path of immersion experience. On the one hand, the majority of junior high school students who are digital natives are no longer unfamiliar with digital devices and digital reading. Their skills and challenges in digital reading are balanced, and they find it easy to enter the immersion state and strengthen their digital reading behavior. On the other hand, this is related to the diversity of digital reading content and its presentation forms. The diversity and performance of digital content meet the various information needs of junior high school students, and rich content forms have become a means to attract their digital reading, with the combination of content forms enabling them to experience satisfaction and pleasure in the process of digital reading, so as to stimulate their more in-depth and committed digital reading behavior.

## 6 Research Deficiencies and Prospects

Limited to the subjective and objective conditions, this study still has the following deficiencies, hoping that future related studies can make improvement and supplement.

Firstly, the selected respondents have certain limitations. The participants in this study are selected from key junior high schools in three cities (Nanning, Guilin, and Liuzhou) where the economic development is relatively good, with the coverage of digital technology wide in Guangxi. There is a lack of research on junior high school students from other cities, and it is possible that the sample representation might therefore be insufficient. In the future, we should select representative samples in regions with different economic and cultural levels for comparative research, analyze whether the influencing factors of junior high school students' digital reading behavior in different regions are consistent, further improve the research conclusion, and increase the universality of the research findings.

Secondly, when constructing the influencing factors model of Guangxi urban junior high school students' digital reading behavior, the influencing factors considered may lack comprehensiveness. In the future, we can more comprehensively study and analyze the relevant literature, deeply and comprehensively explore the factors affecting junior high school students' digital reading behavior, and better ensure the completeness and coverage of the influencing factors.

Thirdly, the investigation process of the study was during the Covid-19 epidemic, and the digital reading willingness and behavior of junior high school students in urban Guangxi may have been affected by the special environment. Future related studies can compare this result with the influencing factors of junior high school students' digital reading behavior in a conventional environment, so as to better understand the influence of external factors on digital reading behavior and the entire context.

## 7 Conclusion

To conclude, performance expectations, effort expectations, social influence, and immersive experience all positively influenced the junior high school students' digital reading behavior through their digital reading willingness. It was an early introduction of immersive experience in the study of digital reading behavior, specifically exploring the digital reading patterns of junior high school students who had received less attention in previous studies but were in a critical period of growth.

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