

# An Investigation into Digital Literacy and Autonomous Learning of High School Students

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## Abstract

The rapid development of digital technologies and the internet has redefined access to language resources and approaches to language learning. High school students are experiencing more digitalized learning activities, which influences their independent learning mode. In Autonomous Learning and Digital Literacy, rare research has been done to examine the relationship between the two. Drawn from responses of 224 high school students to the questionnaires, this study investigated their digital literacy level from five dimensions, such as knowledge acquisition, and their autonomous learning situation from two perspectives. The results showed that the participants have a certain degree of digital literacy, have a high desire to learn, and their self-management capacity is at a medium level. Yet there is no correlation between students' levels of digital literacy and their levels of autonomy as learners. The findings may prompt educators to prioritize encouraging digital literacy and student agency in the classroom.

**Keywords:** autonomous learning, digital literacy, English teaching and learning

## 1. Introduction

English Curriculum Standard for Senior High School (2017) clearly states that “optimizing learning methods and improving autonomous learning ability” is one of the basic concepts of English teaching and learning in senior high schools. The changes in the curriculum standards reflect that learner autonomy is the need of the times for the transformation of the current learning patterns. At the high school level, where students are maturing in several aspects, developing autonomous learning skills is of great relevance to their future social development.

Since the 21st century, the mode of autonomous learning for high school students has changed dramatically due to the rapid development of digital technology and the widespread use of digital tools. Contemporary high school students can easily access rich learning resources from the Internet, which breaks the bottleneck of finite foreign language learning resources in the past and also surmounts the limitation of foreign language learning in the region. From the early days when teachers in the classroom guide students, they are now using computers and the Internet for autonomous learning anytime and anywhere. However, while the use of digital technology for independent English learning is certainly in line with the trend of Internet development, the survey shows that the situation of students' autonomous learning today is not ideal. Many high school students are addicted to the Internet, searching for answers through the Internet, and believing in false information in the process of learner autonomy. Therefore, this change has put forward new requirements for the digital literacy of autonomous learners, and promoting the digital literacy ability of independent learners has become an imperative need for the progress of the era.

This paper adopts a combination of qualitative and quantitative methods, aiming to investigate the current situation of students' self-directed learning ability and digital literacy, and to explore the relationship between them, to provide useful references for cultivating and improving students' digital literacy and self-directed learning ability.

## 2. Literature Review

### 2.1 Definition of Core Concepts

Digital literacy and foreign language autonomous learning have been extensively researched in domestic and international academia, but these two concepts are defined differently in different studies.

### 2.1.1 Definition of Digital Literacy

Scholars' understanding of digital literacy can be roughly divided into the following three categories.

The first category focuses on the importance of information computer technology capabilities in digital literacy. The famous scholar Glistler (1997) proposed that digital literacy refers to the attitude, understanding, and skills of effectively processing and communicating information in a multimedia environment, mainly including the ability to acquire, understand and integrate digital information, specifically including the skills of Internet search, hypertext reading, digital information criticism, and integration. According to Ting (2015), digital literacy refers to the knowledge and skills used in the digital world, which are embodied in using digital technologies, communication tools, and the Internet to search, manage, synthesize, evaluate and create information to be competent for work and life in a knowledge society.

The second type of research emphasizes information competency in digital literacy; that is, information competency plays a central role while technology is only a supporting tool to some extent. Bawden (2001) considers digital literacy as the ability to critically assess the sources of content and presentations, to construct knowledge about different and discontinuous sources of information, manage the information received and create strategies for personal information, and benefit from interpersonal networks.

The third research category regards digital literacy as an integrated competency that integrates skills, knowledge, and attitudes. Israeli scholar Yoram Eshet-Kalai (2004) holds that digital literacy includes five aspects: photo-visual literacy, reproduction literacy, branching literacy, information literacy, and social-emotional literacy. According to Ng (2012), digital literacy is a variety of literacies related to the use of digital technology, including technical, cognitive, and social-emotional dimensions. A digital person needs to have both the ability to use computers and Internet technology in a digital environment. At the same time, they need to have the ability to think critically and abide by network norms, and use the network responsibly to communicate, socialize and learn. Zhang (2019) integrates information technology capabilities with digital capabilities, arguing that both are used to manipulate new media technologies to effectively handle and control the existence, dissemination, and use of information.

To sum up, there is no unified definition of "digital literacy" in the academic community. Combined with the content of this study, the author believes that digital literacy is a comprehensive ability, which refers to students' ability to apply digital technology confidently and critically in learning life and to analyze, understand, select, criticize and create digital content through digital technology, not only for students learning, but also for their use of digital technology in life, which is an essential general ability for them in a digital society.

### 2.1.2 Definition of Autonomous Learning

The concept of autonomous learning originated in the 1950s when the Western educational field discussed how to develop students' lifelong learning and independent thinking skills. With the continuous development of education and psychology, scholars gradually realized that learning varies among individuals.

The concept of autonomous learning was first introduced by Holec (1981). He defined the term as "the ability which the learner is in charge of their learning". That means the learners can independently set the learning goals, control the learning content and speed, select the learning methods and strategies, monitor the learning process, and make a self-evaluation. The edition of Holec's definition in the field is considered the foremost widely recognized definition, which lays a solid foundation for the subsequent study. Based on his understanding of autonomous learning, many scholars propose their explanations of autonomous learning from different perspectives.

Bound (1988) points out that the main characteristic of self-directed learning is that students not only respond to what they are taught but also take responsibility for their learning. Based on Holec's definition, Little (2003) places psychological factors at the core of autonomous learning and believes that the autonomy of language learning depends on transcendent and critical thinking, decision-making, as well as the training and cultivation of independent action ability. Based on the feedback of efficiency and technique, Zimmerman (1990) puts forward autonomous learning referred to the autonomous learner actively choosing and apply autonomous learning strategies to achieve the ideal outcome.

In summary, although scholars at home and abroad have outlined the concept of self-directed learning differently, they have generally revealed the essence of self-directed learning. Based on Holec's theory, the author divides autonomous learning into two dimensions: learning desire and self-management.

## 2.2 Studies on Digital Literacy and Autonomous Learning

The research on “digital literacy” has undergone significant changes, expanding from the initial focus on school education and public cultural services to more diverse research topics. In recent years, the development of digital literacy, including the development of digital literacy in primary and secondary education, has become a hot topic in digital literacy research. However, there are still not many studies linking digital literacy with autonomous learning.

In terms of research on Digital literacy and autonomous learning, Ito et al. (2009) conducted a “Digital Youth Project” in the United States. They found that the Digital world has lowered the threshold of autonomous learning for young people. He argues that young people’s use of digital technology is largely self-directed or exploratory, as opposed to purposeful classroom learning. A young Brazilian music video producer, for example, subtitled Japanese cartoons in English and posted them online. It involves language learning, but it’s not the goal. It is just a by-product. The same is true for video uploads and online games. More and more young people today are developing their hobbies and connecting with young foreigners through the Internet and the English medium. All these activities link autonomous learning with digital technology.

Ting (2015), through an empirical study, discusses the relationship between digital literacy, school curriculum learning, and autonomous learning under negotiated learning mode. According to the study, 36 college students who took a multimedia engineering course developed their autonomy by using digital literacy to solve problems. It was pointed out that contemporary university students are “digital natives” who are acquiring various digital skills autonomously to enrich their daily leisure time. These digital skills should be linked to autonomous learning in the curriculum, and the consultative learning method can promote independent learning and further improve students’ digital literacy.

Lee et al. (2017) conducted an empirical study in two Hong Kong universities to investigate the relationship between autonomous learning, the use of computer technology, and related learner factors among 404 students in English courses. The results showed that the three elements of self-directed learning (self-management, willingness to learn, and self-control) are positively related to computer use and independent learning, with a willingness to learn is the most closely related to computer use. They emphasized that the key to promoting students’ autonomous learning through computer technology is finding ways to enhance their desire to learn, especially for younger students. Sun and Tang (2020) conducted a one-year flipped classroom teaching experiment with 123 students from China Women’s University as research objects, proving that the integration of college English and digital literacy education can effectively improve students’ digital literacy ability and English autonomous learning ability. Xu (2020) proposed that the autonomous learning ability of foreign language majors covers four aspects: self-planning ability, self-exploration of effective learning strategies, self-emotion management ability, and multi-interactive learning ability. Among them, the capacity of multiple-interactive learning is reflected in whether learners can independently interact through various information communication media and information technology platforms such as wikis, social networking websites, online learning management systems, etc. It can be seen that students’ autonomous learning ability is closely related to their digital literacy. Saraswati et al. (2021) also explored the relationship between students’ autonomous learning and digital literacy, with special attention to speaking class. Lai and Su (2021) discussed autonomous learning in the foreign language MOOCs environment. They believe that students’ autonomous learning ability is closely related to MOOCs teaching. As MOOCs are a typical representative of digital resources, to some extent, it proves the influence of students’ digital literacy on autonomous learning.

To summarize, there are a few studies on digital literacy and autonomous learning. Most research objects are concentrated in universities and secondary vocational schools, with few studies involving high school students. Through questionnaire survey method, this paper aims to understand the current situation of digital literacy and autonomous learning of high school students and explore the relationship between them.

## 3. Methodology

### 3.1 Subjects of the Experiment

The subjects of this study are 224 high school students in a Jiangxi high school. Among these students, 215 had computers at home, accounting for 95.98% of the subjects, and only 9 students (4.02%) did not have computers at home: sixty-seven students, or 29.9%, own telephones. One hundred percent of the students will surf the Internet (see Table 1) for time and purposes of surfing the Internet).

Table 1. The length of time and purposes of students' surfing the internet

N=243	Yes	No				
<b>Whether usually go online or not</b>	224 (100%)	0 (0%)				
<b>The average time of go online everyday</b>	Under 1h. 39 (17.41%)	1h.-2h. 103 (45.98%)	2h.-3h. 52 (23.21%)	3h.-4h. 23 (10.27%)	4h.-5h. 5 (2.23%)	Beyond 5h. 2 (0.89%)
<b>The purpose of go online</b>	Entertainment 144 (64.29%)	Study 51 (22.77%)	Social life 23 (10.27%)	Other 6 (2.68%)		

### 3.2 Instruments

The research instrument for this study was questionnaire surveys, which consisted of questionnaire I and II. They are in the form of Likert Scale, with 5 representing the highest score and 1 representing the lowest.

The questionnaire I, inspired by the article of Luo (2017) and Guo (2017), is a survey on learners' digital literacy, which is divided into five dimensions: acquiring knowledge, share and communication, solving problems, and recreation. The five dimensions are designed to learn about the subjects' use of computers, software, the Internet, etc. The Cronbach's alpha of questionnaire I was 0.870(see Table 2), with high intrinsic reliability.

Table 2. Reliability statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.870	.881	15

Questionnaire II is a survey on students' autonomous learning, which is designed based on Holec's (1981) definition of autonomous learning and modified from Lee et al.'s (2017) questionnaire. According to Holec (1981), autonomous learning includes learning willingness and self-management of their learning. Therefore, the questionnaire is divided into two dimensions: desire to learn and self-management to understand the learning willingness and self-management learning ability of the subjects. The Cronbach's alpha of the questionnaire was 0.911(see Table 3), with high intrinsic reliability.

Table 3. Reliability statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.911	.921	12

## 4. Data Analysis and Discussion

### 4.1 Students' Digital Literacy

#### 4.1.1 Applying Skills

"Applying skills" include "using digital tools (e.g., Excel, PowerPoint, etc.) proficiently," "utilizing web knowledge and technology to search and filter effective information according to needs," as well as "using digital

tools (such as mind mapping, etc.) to categorize knowledge.” Their mean values are 3.26, 3.68, and 3.33, respectively.

Table 4. Applying skills(N=224)

	1	2	3	4	5	M
Using digital tools (e.g., Excel, PowerPoint, etc.) proficiently	14 (6.25%)	16 (7.14%)	111 (49.55%)	63 (28.13%)	20 (8.93%)	3.26
Utilizing internet to search and filter effective information according to needs	4 (1.79%)	8 (3.57%)	80 (35.71%)	96 (42.86%)	36 (16.7%)	3.68
Using digital tools (such as mind mapping, etc.) to categorize knowledge	5 (2.23%)	37 (16.52%)	87 (38.84%)	69 (30.8%)	26 (11.61%)	3.33

As shown in Table 4, only 8.93% of the students are very proficient in using digital tools such as Excel and PowerPoint, 28.13% are relatively professional, most of the students are not skillful, and 6.25% of the students do not know how to use the software at all. Those who can search and filter useful information very skillfully account for 16.7%, and those who are relatively skillful account for 42.86%. Only 11.61% of the students are very experienced in using digital tools to categorize knowledge, 30.8% are proficient, and 2.23% are completely unable to use digital tools to organize knowledge.

The results show that the digital literacy of high school students is at the middle level in terms of applying skills. More than half of the students can search and screen information online according to their own needs, indicating that contemporary high school students can flexibly use Internet search technology, and have good judgment and discrimination ability. In addition, only a small number of students are proficient in using digital tools such as Excel and PowerPoint, using digital tools to organize their knowledge, which may be related to the fact that they seldom use the software in daily life.

#### 4.1.2 Acquiring Knowledge

Table 5. Acquiring knowledge(N=224)

	1	2	3	4	5	M
Learning through online classes such as MOOCs	0 (0%)	11 (4.91%)	67 (29.91%)	105 (46.99%)	41 (18.3%)	3.79
Utilizing educational apps (BaiCiZhan, etc.) for language learning and practice	1 (0.45%)	11 (4.91%)	50 (22.32%)	97 (43.3%)	65 (29.02%)	3.96
Searching for English websites to learn about international events	22 (9.82%)	40 (17.86%)	97 (43.3%)	51 (22.77%)	14 (6.25%)	2.98

“Acquiring knowledge” (see Table 5) includes “Learning through public classes offered by online learning platforms and websites such as MOOCs,” “Taking advantage of educational apps (BaiCiZhan, Shanbei, etc.) for language learning and practice,” and “searching for English websites to learn about international events,” the mean values of these three items are 3.79, 3.68 and 3.33, respectively.

Only 2.98% of students always go to English websites to learn about international events, and 22.77% often go. The rate of students who always watch public lessons through online learning platforms is 18.3%, and the percentage of those who care them frequently is 46.99%. Students who always use educational apps for language learning and practice account for 29.02%, and those who use them regularly account for 43.3%.

It can be seen that the Internet is not a regular part of high school student’s daily life to learn about the international situation. Instead, they prefer to watch open classes on learning platforms and practice language knowledge

through educational apps. How to encourage and guide high school students to use computers and the Internet to study autonomously is worth further discussion.

#### 4.1.3 Share and Communication

“Share and communication” (see Table 6) include “using email, We Chat, QQ, etc. to communicate with teachers and students”, “using multiple channels to share information with classmates”, and “chatting with friends online”, with mean values of 4.01, 4.22 and 4.3 respectively.

Table 6. Share and communication(N=224)

	1	2	3	4	5	M
Using email, We Chat, QQ, etc. to communicate with teachers and students	3 (1.34%)	6 (2.68%)	53 (23.66%)	86 (38.39%)	76 (33.93%)	4.01
Using multiple channels to share information with classmates	0 (0%)	2 (0.98%)	43 (19.2%)	82 (36.61%)	97 (43.3%)	4.22
Chatting with friends online	1 (0.45%)	1 (0.45%)	40 (17.86%)	70 (31.25%)	112 (50%)	4.3

33.93% of the students can always communicate with their classmates and teachers through E-mail, WeChat, QQ, etc., and 38.39% of them are comparatively frequent. Few students (1.34%) do not use social software at all. The percentage of students who can always use multiple channels, such as Baidu Netdisk, QQ, We Chat, email, etc., to share information with their classmates is 43.3%, and 36.61% less often. 50% of high school students always chat with their friends online, 31.25% less often, and very few students (0.41%) do not communicate with their friends online.

It can be seen that the tested students are very willing to communicate, share, and cooperate with their classmates and teachers online, which is consistent with the research results of some foreign scholars. So (2009) argues that the ease and timeliness of online communication are critical to group collaboration. Other scholars, such as Thorne et al. (2009), argue that collegiality, initiative, and the ability to create learning opportunities are equally important in a digital context. For high school students, good cooperation and communication skills are crucial for their future social life.

#### 4.1.4 Solving Problems

Table 7. Solving problems (N=224)

	1	2	3	4	5	M
Solving problems online by yourself	1 (0.45%)	1 (0.45%)	37 (16.53%)	92 (41.07%)	93 (41.52%)	4.23
Seeking advice from strangers online	10 (4.46%)	35 (15.63%)	80 (35.71%)	61 (27.23%)	38 (16.96%)	3.37
Asking teachers and students for advice through We Chat or QQ	1 (0.45%)	6 (2.68%)	60 (26.79%)	81 (36.16%)	76 (33.93%)	4

“Solving problems” (see Table 7) includes “solving problems online by yourself”, “seeking advice from strangers online”, “asking teachers and students for advice through We Chat or QQ”, etc. The average values are 4.23, 3.37, and 4, respectively.

41.52% of students always use the Internet to solve problems in studying by themselves, and 41.07% of them less often. 33.93% always take advantage of We Chat or QQ to ask for advice from teachers and students, and 36.16% less often; Those who always ask for advice from strangers on the Internet account for 16.96%, and those who never or rarely ask strangers for advice online account for 20.09%.

According to the survey results, when students encounter difficulties in learning, they tend to solve the problems by themselves or ask their classmates or teachers for advice, and relatively few of them go online to ask strangers for advice, which indicates that most high school students are more alert and have a stronger awareness of Internet security.

#### 4.1.5 Recreation

Table 8. Recreation(N=224)

	1	2	3	4	5	M
Play games online	24 (10.71%)	27 (12.05%)	63 (28.13%)	58 (25.89%)	52 (23.21%)	3.39
Watching English videos online	7 (3.13%)	25 (11.16%)	82 (36.61%)	66 (29.46%)	44 (19.64%)	3.51
Listening to English songs online	2 (0.89%)	11 (4.91%)	56 (25%)	70 (31.25%)	85 (37.95%)	4

“Recreation” (see Table 8) includes “playing games online”, “watching English videos online” and “listening to English songs online”, with mean values of 3.39, 3.51, and 4, respectively. 23.21% of high school students always play computer games, 25.89% often, 12.05% occasionally, and 10.71% never play games online. 19.64% of the students watch English videos online, and 29.46% often. Those who always listen to English songs on the Internet account for 37.85%, and 31.25% of students often listen to English songs online.

It follows that most of the students like to listen to English songs online, followed by watching English videos, but not most of them play games online. It is generally consistent with the findings of other scholars, such as Gil-Flores et al. (2012), who found that students spent much of their spare time browsing online for things they were interested in, communicating with friends and family, downloading movies, music, listening to songs, playing games, and so on. To some extent, this also reflects that students have a certain degree of digital literacy. Ting (2015) argues that acquiring this literacy is mostly spontaneous, mainly arising from the need for students’ entertainment and social life and that they learn computer and Internet knowledge and skills independently outside of class.

#### 4.2 Students’ Autonomous Learning

Holec(1981) proposed that learner autonomy must meet two prerequisites: first, learners are willing to be responsible for their learning; Second, they can manage their learning. In short, autonomous learning mainly involves two dimensions: learning desire and self-management.

##### 4.2.1 Learning Desire

Table 9. Learning desire(N=224)

	1	2	3	4	5	M
I enjoy the learning process	4 (1.79%)	10 (4.46%)	87 (38.84%)	93 (41.52%)	30 (13.39%)	3.6
I’d like to know I’m learning something new	4 (1.79%)	7 (3.13%)	73 (32.59%)	101 (45.09%)	39 (17.41%)	3.73
I enjoy learning new skills	3 (1.34%)	4 (1.79%)	57 (25.45%)	111 (49.55%)	49 (21.88%)	3.89
I have a need to learn	5 (2.23%)	15 (6.7%)	88 (39.29%)	87 (38.84%)	29 (12.95%)	3.54

“Learning desire” (see Table 9) includes “enjoying the learning process”, “enjoying learning something new” and “enjoying learning new skills” and “have a need to learn”. The students who always enjoy the learning process account for 13.39%, those who enjoy it account for 41.52%, and very few students (1.79%) cannot enjoy the learning process. Students who like learning new knowledge very much account for 17.41%, and those who want it account for 45.09%; Those who always enjoy learning new skills account for 21.88%, and 49.55% of the students

comparatively want to learn skills. What's more, only a few students don't like learning new knowledge and new skills. Students who are always full of desire to learn account for 12.95%, those who are willing to learn account for 38.84%, and only a very few students (2.23%) have no desire to learn.

In general, the tested students have a high level of desire to learn. Learning desire is an integral part of learner autonomy. The main characteristic of an autonomous learner is the willingness to self-manage learning to serve personal needs and purposes.

#### 4.2.2 Self-management of their Learning

“Self-management” (see Table 10) means that students can be responsible for their learning, including proper scheduling, setting strict time frames, self-discipline, self-determination, setting their own learning goals, choosing their learning materials and methods, and self-assessment.

Table 10. Self-management(N=224)

	1	2	3	4	5	M
I manage my time well	7 (3.13%)	28 (12.5%)	95 (42.41%)	78 (34.82%)	16 (7.14%)	3.3
I set strict time frames	18 (8.04%)	59 (26.34%)	101 (45.09%)	34 (15.18%)	12 (5.36%)	2.83
I am self-disciplined	13 (5.8%)	36 (16.07%)	105 (46.88%)	54 (24.11%)	16 (7.14%)	3.11
I like to make decision for myself	5 (2.23%)	18 (8.04%)	65 (29.02%)	106 (47.32%)	30 (13.39%)	3.62
I prefer to set my own learning goals	3 (1.34%)	13 (5.8%)	76 (33.93%)	110 (49.11%)	22 (9.82%)	3.6
I evaluate my own performance	5 (2.23%)	20 (8.93%)	97 (43.3%)	80 (35.71%)	22 (9.82%)	3.42
I decide more suitable learning approaches	4 (1.79%)	20 (8.93%)	99 (44.2%)	79 (35.27%)	22 (9.82%)	3.42
I choose my own learning materials	2 (0.89%)	13 (5.8%)	79 (35.27%)	99 (44.2%)	31 (13.84%)	3.64

The results show that 7.14% of the students are fully able to arrange their time rationally, and 34.82% can do so. Only 5.36 percent of students are fully capable of following the schedule, and 15.18 percent are moderately competent. Students with complete self-discipline accounted for 7.14%, and those with comparative self-discipline accounted for 24.11%. The students who can always make decisions alone account for 13.39%, and those who can make decisions most of the time account for 47.32%. 9.82% of the students can set their own learning goals totally by themselves, and 49.11% are less able to set learning purposes. The percentage of students who can choose their study materials is 13.84%, and 44.2% are more able. 9.82% of the students can definitively choose their learning methods, 35.27% of the students are less capable. The students who are capable of self-assessment account for 9.82%, and those who are relatively qualified account for 35.71%.

On the whole, the self-management ability of the test students is at a medium level, among which the mean value of “being able to choose learning materials by myself” (M = 3.64) is the highest, followed by “being able to make decisions by myself” (M = 3.62), “setting learning goals by myself” (M = 3.60) and “self-assessment learning” (M = 3.42), “choose a learning method that works for you” (M= 3.42), “manage your time” (M= 3.30), and “being self-disciplined” (M= 3.11). However, “having strict time frames.” (M= 2.83) is the only option with a score below 3, which is in the lower-middle range.

The above data analysis reveals that students' self-management skills are yet to be improved, especially the ability to make and follow schedules. Self-management ability is the key to autonomous learning. An independent learner should be able to decide on learning goals, determine learning content and schedule, choose learning methods and techniques, monitor the acquisition process and evaluate learning effects.



## 4.3 The Relationship between Students' Digital Literacy and Autonomous Learning

Table 11. Self-management(N=224)

	Applying skills		Acquiring knowledge		Share and communication		Solving problems		Reflection		Learning desire		Self-management	
	Pearson Correlation	Sig. (2-tailed)	Pearson Correlation	Sig. (2-tailed)	Pearson Correlation	Sig. (2-tailed)	Pearson Correlation	Sig. (2-tailed)	Pearson Correlation	Sig. (2-tailed)	Pearson Correlation	Sig. (2-tailed)	Pearson Correlation	Sig. (2-tailed)
Applying skills	1		.426**	.000	.413**	.000	.363**	.000	.345**	.000	-.073	.275	.075	.263
Acquiring knowledge	.426**	.000	1		.469**	.000	.473**	.000	.396**	.000	.087	.194	.134*	.045
Share and communication	.413**	.000	.469**	.000	1		.725**	.000	.383**	.000	.094	.162	.161*	.016
Solving problems	.363**	.000	.473**	.000	.725**	.000	1		.430**	.000	.067	.318	.121	.072
Reflection	.345**	.000	.396**	.000	.383**	.000	.430**	.000	1		-.031	.640	.059	.379
Learning desire	-.073	.275	.087	.194	.094	.162	.067	.318	-.031	.640	1		.629**	.000
Self-management	.075	.263	.134*	.045	.161*	.016	.121	.072	.059	.379	.629**	.000	1	

(\*\*, P<0.01, significantly correlated; \*, p<0.05, significantly correlated)

The results of the research analysis (see Table 11) show that the two variables of “learning desire” and “self-management” of the interviewed high school students are not related to the five numerical literacy of “application skills”, “acquisition of knowledge”, “solving problems”, and “entertainment and relaxation” as expected. Among them, “knowledge acquisition” and “sharing and communication” are significantly correlated with self-management (Pearson’s correlation coefficient is 0.134 and 0.161). The two variables of autonomous learning, “learning desire” and “self-management”, are significantly correlated (Pearson’s correlation coefficient is 0.629, and P=0.000<0.01). By comparison, it can be found that this is not in line with the results of Hua’s study (2020). She discovered a significant correlation between “solving problems” and “learning desire”, and therefore inferred that learning desire is closely related to the computer using proficiency. However, this research confirms to a certain extent the research results of some scholars (Lee et al. 2017), that is, students with strong self-management abilities can take the initiative to search for knowledge and information online and are willing to ask peers or teachers for help, as their independent learning and digital literacy will also be improved.

## 5. Conclusion

This study found that the test students have higher learning aspirations in self-directed learning but perform slightly better in self-management, especially in terms of setting and complying with timetables that need to be improved. As for digital literacy, students have mastered certain digital information processing and utilization skills, but there are still differences in how to use the Internet to acquire and organize knowledge, sharing and communication, and entertainment activities. In addition, the research results also show a positive correlation between the two variables of students’ self-learning learning desire and self-management and the five variables of digital literacy mentioned above. Among them, “acquisition of knowledge” and “self-management” are significantly related. In other words, students with strong self-management skills can often use the Internet more effectively to acquire knowledge to solve problems and expand their knowledge. Therefore, it is necessary and extremely important to improve students’ self-learning ability and digital literacy level.

Schools can develop a series of digital technology courses, use libraries or online course platforms for publicity, and consciously cultivate students’ digital literacy in a targeted manner to conform to the development needs of the times. At the same time, teachers should also update teaching techniques and concepts, combine the characteristics of the digital age, and explore with students how to conduct digital teaching and to learn more effectively. On the other hand, students can also make full use of the advantages of the Internet to set up interest groups, exchange ideas and experiences online, and share resources and information; they can use existing resources to set up personal simulation learning spaces, try independent learning, and finally achieve digital literacy training and the improvement of English proficiency is a win-win situation.

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