EFL Digital Literacy Skills and Autonomy among Normal School Students in China

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Abstract— *This study investigated the digital literacy skills and autonomy among EFL students at normal schools in China. Using adapted questionnaires distributed to 405 participants, data were analyzed via Weighted Mean, Ranking, Regression Analysis, and ANOVA. The study revealed that students exhibited strong digital literacy, information sourcing, and analysis skills, with high autonomy in language learning. However, they struggled with proficiency analysis and synthesizing learning strategies, indicating a need for interventions. The findings underscore the importance of programmatic interventions tailored to student profiles. Autonomy is crucial in enhancing digital literacy, suggesting an integrated curriculum to bolster these skills among normal school students in China.*

Keywords— *EFL Digital Literacy Skills, Autonomy, Normal School Students*

I. INTRODUCTION

The global trend of digitalization impacts all aspects of life, including English language learning. Digital literacy is crucial for teachers in this context, highlighted by China's National Industry Standard "Digital Literacy of Teachers" issued in 2022. Proficiency in L2 digital literacy skills is now essential for effective EFL learning. Critical digital literacy involves understanding and assessing digital technologies and media.

In English education, proficiency in digital technologies and materials is vital. For EFL learners, developing these skills enhances language learning and proficiency. Kim, Park, and Baek (2018) show that digitally literate teachers better guide students in digital environments. However, little attention has been given to the intersection of digital literacy with autonomy in EFL studies. Autonomy is central to EFL research. Autonomy involves learners managing, guiding, and assessing their learning, fostering adaptability and efficiency. Integrating English language studies with psychology deepens understanding of the cognitive processes involved in language acquisition and learning.

This study investigates digital literacy and autonomy among EFL students in China, aiming to provide theoretical and practical insights. It examines how digital literacy affects autonomy, demonstrating its impact on teaching effectiveness and student achievement. The research highlights the importance of digital literacy in promoting autonomy and suggests avenues for future investigation.

The study's significance lies in its potential to enhance teacher education and foreign language teaching, inform educational policies, and promote equity and modernization. By integrating digital literacy and autonomy into teacher training, the research aims to reduce education disparities and ensure quality education for all. Well-prepared,

confident teachers can better face digital age challenges, contributing to a fair and effective educational system.

II.   METHODOLOGY

Research Design

Descriptive research was employed in this setting to collect specific data regarding the autonomy and digital literacy skills in EFL students attending Chinese Normal Schools.

Questionnaire data were collected and analyzed using the Social Science Statistics Software Package (SPSS, 26.0). This approach allowed the researchers to describe the demographic profile of the respondents, measure their digital literacy skills and autonomy in language learning and examine the correlations between two variables. Specifically, weighted means, rankings, regression analysis, and ANOVA were employed to analyze the data and identify patterns and relationships within the population studied.

Participants

This study was conducted at two teacher-training schools in China. A total of 450 was determined using appropriate sampling methods to ensure representativeness

and accuracy with a 95% confidence level, and a 5% margin of error.

Instruments

This study used two modified questionnaires to collect respondents' demographic information (gender, age, and major) and specific data on digital literacy and autonomous English learning. The first questionnaire, adapted from Seghayer (2020), assessed digital literacy skills in three dimensions: information-searching skills (5 statements), critical evaluation of online information (7 statements), and synthesizing digital resources (4 statements). The second questionnaire, developed by Lin Lilan (2013), measured autonomous English learning with 28 items across three factors: self-management learning ability (7 items), autonomous learning psychology (9 items), and autonomous learning behavior (12 items). Responses were also on a 4-point Likert scale. The questionnaires underwent content validation by experts and a pilot study with 30 respondents to ensure reliability, with Cronbach's alpha coefficients for each scale meeting the minimum standard of 0.70 as per George et al. (2003).

III.   RESULTS AND DISCUSSION

3.1 Digital Literacy Skill

Table 1 Summary Table on Digital Literacy

Indicators	Weighted Mean	Verbal Interpretation	Rank
1. Information-Searching Skills and Strategies Scale (ISSS)	2.74	Agree	3
2. Evaluating Online Information Critically (EOIC) Scale	2.90	Agree	2
3. Synthesizing Digital Resources Strategy Scale (SDRS)	2.93	Agree	1
Composite Mean	**2.86**	**Agree**	

Legend: 3.50 – 4.00 = Strongly Agree; 2.50 – 3.49 = Agree; 1.50 – 2.49 = Disagree; 1.00 - 1.49 = Strongly Disagree

Table 1 presents a summary of the respondents' digital literacy skills across three indicators: information-searching skills and strategies (ISSS), evaluating online information critically (EOIC), and synthesizing digital resources strategy (SDRS). The composite mean of 2.86 indicates that respondents generally agreed with the statements across these scales.

Respondents' agreement across the three indicators suggests they believe they have a reasonable level of ability in their technology literacy. The highest ranking of the SDRS scale shows their ability to synthesize and integrate

information from other digital sources is strong; something that is necessary for effective learning in an online environment. Second was the EOIC scale. This scale illustrated the importance of critically evaluating the reliability and credibility of information online. Lastly, the ISSS scale, which respondents still agreed that they were competent in, ranked third. This may show that respondents felt competent when searching for information, but synthesizing and critically evaluating that information may be what they find more challenging but valuable.

The first-rated indicator, synthesizing digital resources strategy scale (SDRS), is indicative of the respondent's high level of skill in integrating information from multiple digital sources. These skills are critical for advancing a thorough understanding of complex topics and for effective problem-solving. Kinzer et. al. (2017) label skills such as synthesizing information as a fundamental component of digital literacy as they are crucial for allowing a person to build relationships between pieces of information to construct coherently organized knowledge. Similarly, Coiro (2021) specified skills such as summarizing and contrasting information as fundamental components for effective online reading comprehension. Even more importantly, this suggests those who can effectively synthesize information are equipped to move and make sense of the digital information landscape.

The evaluation of online information is equally critical as the second construct, primarily focused on the evaluating online information critically (EOIC) scale, tapped respondents' ability to evaluate the reliability and credibility of online information. This skill is particularly important in the digital age due to the widespread presence of misinformation. Flanagin and Metzger (2000) were the first to stress the importance of evaluating source credibility, examining author expertise, and verifying consistency. Wineburg and McGrew (2017) also underscored the value of being able to differentiate between facts and opinion. The last skill, differentiating factual information from opinions, was especially important for navigating the complex landscape of internet information effectively.

To sum up, from the summary table, it is evident that the respondents generally feel confident in their digital literacy skills, in particular in the areas of being able to synthesize information across various digital sources and critically evaluate the information they find online. The higher ratings for the SDRS and EOIC indicators suggest that these skills are seen as the most significant for effective learning and decision-making in the digital world. The slight drop in confidence in information-searching skills suggests that the development of these skills would further foster learners' digital literacy, enabling them to interact more successfully with digital resources in their academic and everyday lives.

3.2 Autonomy in EFL

Table 2 Summary Table on Autonomy in EFL

Indicators	Weighted Mean	Verbal Interpretation	Rank
1. Self-management Learning Ability	2.96	Agree	2
2. Autonomous Learning Psychology	3.09	Agree	1
3. Autonomous Learning Behavior	2.87	Agree	3
Composite Mean	**2.97**	**Agree**	

Legend: 3.50 – 4.00 = Strongly Agree; 2.50 – 3.49 = Agree; 1.50 – 2.49 = Disagree; 1.00 - 1.49 = Strongly Disagree

Table 2 presents an overview of autonomy in English as a Foreign Language based on various items. The composite mean score of 2.97 indicates an overall agreement among respondents regarding autonomy in EFL.

Among the indicators, indicator 2, autonomous learning psychology rated the highest with a mean of 3.09, which implies that the level of agreement was strong. Respondents generally view themselves as an autonomous learner of the English language and feel proactive in this area. There are several reasons why the respondents rated this item so highly. Research on the topic of autonomy-supportive environments by Deci and Ryan (2012) shows that intrinsic motivation and engagement can be promoted by autonomy-supportive environments. This attitude may also contribute to the high rate of agreement among respondents about Autonomous Learning Psychology.

Ranked at a mean score of 2.96, is indicator 1, self-regulation learning ability, implying that respondents have a good level of self-regulated skills in their learning of a language. The capacity to target their learning, monitor progress, and reflect on these experiences are factors that would have likely contributed to this score. Recent research articles by Cabugsa (2022) discussed the role of self-regulated learning skills like goal setting and self-monitoring in raising levels of learners' accomplishment and motivation in language learning.

Indicator 3, autonomous learning behavior, obtained a mean score of 2.87, which was rated as agree. This indicates that respondents show a proactive attitude in their language learning as demonstrated by the slightly lower-rated Autonomous Learning Behavior than the other two constructs. It would suggest that despite demonstrating proactive behavior in their language-learning process, there are possible ways in which learners could better integrate autonomous learning strategies into their process. The lower rating may also be in part determined by variable access to resources or constraints in terms of their ability to learn autonomously.

Deci and Ryan (2012) stated that the autonomous approach to the learning environment can have an impact on intrinsic motivation and engagement, which in turn will improve learning outcomes. This theory is consistent with the high ranking of autonomous learning psychology in the summary table, indicating that every respondent strongly believed they were autonomous learners.

Dewaele et al. (2019) highlighted the significant role of learner beliefs and attitudes in influencing autonomous language learning behaviors. This is particularly evident in the summary table, where autonomous learning psychology is listed at the top. The respondents' acknowledgment of their proactive role in their learning journey aligns with

their commitment to autonomous learning psychology. The drive and importance of learners developing positive frames of mind also run parallel in the data that the Respondents shared about how they are setting themselves to language learning in an autonomous way by agreeing with statements relating to autonomous psychology.

Additionally, Benson (2013) illustrated the importance of the learner taking more of a unilateral active role within the language learning episode. Although indicator 3, *Autonomous Learning Behavior*, was ranked lower in the summary table, some indications in the ranked boxes demonstrate proactive, constructive undertakings from the Respondents. The idea of being learner-centered from Benson prompts the relevance and importance of creating autonomy for learners in language education; to foster a shift towards being independent and having a say in your learning.

Together, across the categories, the high levels of agreement suggest a strongly positive view of autonomy, particularly autonomous learning in EFL among the Respondents. The theoretical frameworks of autonomy-supportive settings and self-regulation of learning provide some enlightenment in figuring out what impacted the respondents' attitudes and behavior toward autonomous learning in context.

Table 3 Difference of Responses on Digital Literacy When Grouped According to Profile

Sex	**F-value**	**p-value**	**Interpretation**
Information-Searching Skills and Strategies Scale (ISSS)	3.030	0.082	Not Significant
Evaluating Online Information Critically (EOIC) Scale	0.035	0.851	Not Significant
Synthesizing Digital Resources Strategy Scale (SDRS)	0.001	0.978	Not Significant
Age			
Information-Searching Skills and Strategies Scale (ISSS)	0.764	0.466	Not Significant
Evaluating Online Information Critically (EOIC) Scale	2.294	0.102	Not Significant
Synthesizing Digital Resources Strategy Scale (SDRS)	2.728	0.066	Not Significant
Major			
Information-Searching Skills and Strategies Scale (ISSS)	0.097	0.756	Not Significant
Evaluating Online Information Critically (EOIC) Scale	1.997	0.158	Not Significant
Synthesizing Digital Resources Strategy Scale (SDRS)	3.745	0.054	Not Significant

Legend: Significant at p-value < 0.05

Table 3 presents the differences in responses on digital literacy skills when grouped according to profile characteristics, including sex, age, and major. The analysis is based on three indicators: information-searching skills

and strategies scale (ISSS), evaluating online information critically scale (EOIC), and synthesizing digital resources strategy scale (SDRS). The F-values and p-values are provided to determine the statistical significance of

differences between groups. A p-value less than 0.05 is considered statistically significant. The table shows that there are no significant differences in digital literacy skills based on sex, age, or major, as all p-values are greater than 0.05.

The results established that there is no significant difference between the two groups concerning sex. The F-value for the Information-searching skills and strategies scale (ISSS) is 3.030, and the corresponding p-value is 0.082, indicating no significance in the difference between the male and female respondents regarding their information-searching skills. Also, for the EOIC scale, the F-value is 0.035, and the p-value is found to be 0.851, and for the SDRS Scale, the F-value is 0.001 with a p-value of 0.978. From these test statistics, it can be inferred that the variability existing between male and female respondents is not significant in terms of their digital literacy skills. This was also affirmed by recent studies reported by Abrosimova (2020) and Alakrash et. al. (2021), where findings revealed that digital literacy skills generally do not vary by gender when considering other factors such as access to technology and educational opportunities.

The analysis further revealed that age did not have statistically significant differences in the digital literacy skills of the sample. The p-value for the F-ratio for ISSS was 0.466 (0.764), indicating no significant difference in information-searching skills from an age factor. For the EOIC scale, the F-value is 2.294, and the p-value is 0.102; the F-value is 2.728 for the synthesizing digital resources strategy scale, with a p-value of 0.066. The findings of this study, therefore mean that digital literacy skills are not significantly different concerning age. Again, the research from Polizzi (2020) and Feerrar (2019) support this observation, as according to them, the variation in digital literacy due to age is rife only when access and educational interventions to improve digital skills happen at varied paces across age-groups.

Further, digital literacy does not significantly differ. The result from the ISSS shows an F-value of 0.097 with a 0.756 p-value; it states that there is no significant difference between information-searching skills and major. The critical online information evaluating ability scale (EOIC) has an F-value of 1.997 with a p-value of 0.158, while the SDRS attains an F-value of 3.745 with a 0.054 p-value. In this case, the p-value for SDRS by major is close to the significance value; however, at 0.05, it does not reach significance and may suggest some kind of trend that would be worth re-exploring with greater depth, such as more subjects or other independent variables. Significant meaning in the development of particular digital literacy skills has been given about disciplinary context, a point by studies by Milliner and Dimoski (2024) and Reddy et al. (2020). While there may be differences based on primary, these would not be highly significant in this study.

No significant difference was found among recent studies supporting digital literacy skills based on demographic factors. Equitable access to technology and education in digital literacy is also something Abrosimova (2020) called for, which will help reduce the differences that exist along demographic lines. Alakrash and Razak (2021) and Milliner and Dimoski (2024) emphasized the need for broad-based training or digital literacy programs that would enhance equity in skills between different groups due to inclusive educational practices. Generally, there was no significant variance in the level of digital literacy skills attributed to differences in responses concerning sex, age, or significance. These findings would suggest a relatively equal distribution of digital literacy capabilities among these classifications of demographics. In general, this effect is likely to be supported due to equal access to digital literacy resources and student training.

Table 4 Difference of Responses on Autonomy in EFL When Grouped According to Profile

Sex	F-value	p-value	Interpretation
Self-management Learning Ability	1.758	0.186	Not Significant
Autonomous Learning Psychology	0.098	0.754	Not Significant
Autonomous Learning Behavior	0.313	0.576	Not Significant
Age			
Self-management Learning Ability	0.742	0.477	Not Significant
Autonomous Learning Psychology	0.342	0.710	Not Significant

Autonomous Learning Behavior	2.637	0.073	Not Significant
Major			
Self-management Learning Ability	9.387	0.002	Significant
Autonomous Learning Psychology	7.446	0.007	Significant
Autonomous Learning Behavior	1.574	0.210	Not Significant

Legend: Significant at p-value < 0.05

Table 4 presents the differences in responses on autonomy in English as a Foreign Language when grouped according to profile characteristics such as sex, age, and major. The analysis includes three indicators: self-management learning ability, autonomous learning psychology, and autonomous learning behavior; f-values and p-values are provided to determine the statistical significance of differences between groups, with a p-value less than 0.05 considered statistically significant.

The analysis reveals no significant differences in autonomy in EFL based on sex. For self-management learning ability, the F-value is 1.758 with a p-value of 0.186. For autonomous learning psychology, the F-value is 0.098 with a p-value of 0.754, and for autonomous learning behavior, the F-value is 0.313 with a p-value of 0.576. The results show that there exist no statistically significant differences between male and female independence levels in EFL. Little (2019) also agreed by stating that gender does not affect the degree of learner autonomy significantly if factors with concern to the educational environment and support are held constant.

Results reveal no significant difference in autonomy in EFL about age—self-management learning ability F-value 0.742 p-value 0.477. The F is equal to 0.342, with a p-value of 0.710 in autonomous learning psychology, while for autonomous learning behavior, the F is 2.637, with a p-value of 0.073. These results reflect that respondents' autonomy in EFL has no remarkable difference when considering age as a factor. This finding is supported by the research of Gao and Zhang (2020), indicating that sufficient learning strategies and guidance could neutralize age-related differences in autonomy.

The values are followed by significant test statistics on differences in autonomy in EFL by different majors: the F-value is 9.387 in the ability to learn by self-management, with a p-value of 0.002, which is significant; for

autonomous learning psychology, the F-value is 7.446 and p=0.007, which is substantial, but concerning autonomous learning behavior, the F-value is 1.574, p=0.210, not substantial. This sort of finding shows that majors are going to influence self-management learning ability and autonomous learning psychology significantly. It has been pointed out from the works of Guay (2022) and Benson (2007) that the role of academic discipline in fostering learner autonomy can be very diverse, with different possible supports and opportunities for autonomous learning.

Recent research has found some significant differences in autonomy among academic majors. Guay (2022) has shown that autonomy-supportive environments facilitate intrinsic motivation and engagement, both of which are vital to developing skills in self-regulating learning. Williams (2001) focused on strategies for developing autonomous learning behaviors and attitudes in learner-centered approaches. Gao and Zhang (2020) also found that, while age and gender were not statistically significantly related to autonomy, providing varying degrees of autonomy and support is beneficial for all students. From the findings in these studies, interventions can be targeted at institutions that want to encourage autonomy in all learners and can be used to support autonomy relative to academic majors.

In summary, data show that it is not the case that we are seeing significant differences in EFL learners' levels of autonomy based on sex or age, but there are statistically significant differences based on major concerning self-regulating learning and autonomous learning psychology. This makes it clear that the discipline of study plays a substantial role in shaping autonomy in learners. By providing support designed to encourage autonomous learning and more unbounded constraints, educators can encourage autonomy in EFL across various majors.

Table 5 Relationship Between Digital Literacy and Autonomy in EFL

Information-Searching Skills and Strategies Scale (ISSS)	r-value	p-value	Interpretation
Self-management Learning Ability	.269**	0.000	Highly Significant
Autonomous Learning Psychology	.229**	0.000	Highly Significant
Autonomous Learning Behavior	.217**	0.000	Highly Significant
Information Critically (EOIC) Scale			
Self-management Learning Ability	.510**	0.000	Highly Significant
Autonomous Learning Psychology	.360**	0.000	Highly Significant
Autonomous Learning Behavior	.550**	0.000	Highly Significant
Synthesizing Digital Resources Strategy Scale (SDRS)			
Self-management Learning Ability	.547**	0.000	Highly Significant
Autonomous Learning Psychology	.309**	0.000	Highly Significant
Autonomous Learning Behavior	.559**	0.000	Highly Significant

Legend: Significant at p-value < 0.01

Table 5 presents the association between Digital Literacy and Autonomy in EFL. The computed r-values indicate a strong direct correlation and the resulting p-values were less than the alpha level. This means that there was a significant relationship exists and implies that the better the digital literacy is, the better digital autonomy is.

There are strong associations between the r-values for the ISSS and the three facets of autonomy for EFL in which the association of Self-management Learning Ability is fully significant at .269**, p=0.000; Autonomous Learning Psychology at .229**, p=0.000; and Autonomous Learning Behavior at .217**, p=0.000. Students who can perform information searching is more likely to manage their own learning. They are more likely to have the motivation or a psychological state supporting autonomous learning (meaning they have positive thoughts related to learning). They are more likely to use a wider range of language activities and platforms. These results agree with the findings from Ebersold, Rahm, and Heise (2019), Hsieh and Hsieh (2019), who also identify information searching as critical to autonomous learning.

The r-values for the EOIC scale give stronger results for the autonomy facets. The association with self-management learning ability is .510**, p=0.000; autonomous learning psychology is .360**, p=0.000 and autonomous learning behavior is .550**, p=0.000. These results underscore the role of evaluation in affecting autonomous language learning. Both Hockly and Dudeney (2018) indicated a need to move from traditional searches and evaluation to the critical evaluation of online information and the empowering of students to have control of their English learning and to make up their minds.

The r-values for the SDRS also present significant associations with autonomy in EFL. The association with Self-management Learning Ability is .547**, with a p-value of 0.000. The correlation with autonomous learning psychology is .309**, p = .000, and with autonomous learning behavior the correlation is .559**, p = .000. These findings indicate it is crucial for autonomous learning to be able to synthesize digital resources. According to Deursen and Dijk (2014), synthesizing skills allow students to integrate information gathered from many resources. This aspect is being seen as key to self-directed learning and knowledge consolidation.

The relationship between autonomy and digital literacy in EFL has been confirmed by recent research. As Ebersold, Rahm and Heise (2019) highlighted, digital literacy underpins the importance of learner autonomy. Similarly, Hockly and Dudeney (2018) support the critical evaluation of information, decision-making, and self-management in learning. Deursen and Dijk (2014) argued for an emphasis on synthesizing information from different sources to enable autonomous learning. Integrated with the above, the significance of these findings means that there is potential

to design digital literacy programs that will enhance learner autonomy and overall language proficiency. To conclude, the data indicates a significant positive relationship between digital literacy and autonomy in EFL for the three constructs (ISSS, EOIC, and SDRS). This suggests that by improving digital literacy, student autonomy in language learning may be significantly enhanced. Therefore, educators should pay attention to developing students' information searching, critical evaluation, and synthesizing skills to promote greater autonomy. This will enable learners to be more independent and effective at managing their learning which is vital in the current digital age.

IV.   CONCLUSIONS

With the results obtained from the data gathered, the following conclusions were produced. The assessment of students' digital literacy skills indicated a generally positive perception across key areas, including information-searching skills and strategies, critical evaluation of online information, and strategy for synthesizing digital resources. Respondents exhibited a high level of autonomy in managing their language learning. However, challenges were noted in evaluating language proficiency and synthesizing learning methods. Digital literacy skills and autonomy in EFL revealed strong positive correlations. Higher levels of digital literacy skills were associated with greater autonomy.

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