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Technological Self-efficacy, Task Value, and Goal Orientation in Improving Digital Literacy for Employment among Liberal Arts University Students in Chengdu

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Abstract

Amid China's digital transformation and increasing employment pressure on liberal arts graduates, this study investigates how motivational beliefs technological self-efficacy, task value, and goal orientation influence digital literacy relevant to employment. A quantitative survey was conducted among 400 liberal arts students in Chengdu. Correlation, regression and variance analyses revealed that all three motivational beliefs were significantly and positively related to digital literacy, with task value emerging as the strongest predictor. The model explained 47.9% of the variance ($R^2 = .479$, $p < .001$). Mastery and performance-approach goals showed positive effects, while performance-avoidance goals had a negative impact. All subdimensions of technological self-efficacy and task value demonstrated consistent positive effects. Significant grade-level differences were found: seniors scored highest in digital literacy and task value, while sophomores reported the highest technological self-efficacy. Goal orientation remained stable across grades. University type significantly affected goal orientation only, with students from "Double First-Class" universities scoring higher. The findings offer both theoretical and practical implications for developing targeted interventions and motivation-enhanced curricula to improve students' employability in the digital era.

Keywords**:** *digital literacy; technological self-efficacy; task value; goal orientation; liberal arts students*

1. Introduction

1.1 Background and Rationale

Chengdu, the capital city of Sichuan Province, is widely recognized as the central city of western China. In recent years, Chengdu has played a leading role in China's digital transformation. According to "The 2023 Research Report on the Competitiveness of Digital Cities in China", Chengdu has emerged as the core city driving the development of the digital economy in central and western China, ranking fifth nationwide regarding overall digital economy competitiveness. The city has demonstrated outstanding growth in sectors such as digital healthcare, digital transportation, and logistics, far exceeding national averages. Chengdu is also a key player in the digital gaming industry, often referred to as the "Fourth City of Gaming" and the "City of Mobile Games." Games like King of Glory have generated billions in revenue and achieved global popularity. As a rapidly developing digital metropolis, Chengdu's progress reflects the increasing integration of digital technologies into various industries and the rising demand for digital talent.

Meanwhile, in the broader context of employment, employability is regarded as a key requirement in the workplace (Osmani et al., 2019). Graduates who possess employable skills are likely to have more job opportunities, which also benefit themselves in work, and ensure their sustainable employment. However, modern work increasingly requires technical support (Khan et al., 2022). The business, market, economy, and industry environment are increasingly dominated by digital technologies. It is essential to have the ability to deal with information collaboratively and innovatively in order to face rapid changes in digital technologies (Mittal, 2020). Therefore, digital literacy is a critical factor increasingly needed by the labor market (Guitert et al., 2020). It is of key importance not only for getting a job offer, but also for job-searching. The internet has become the central resource for job information. Candidates usually search for jobs using online tools. Generally speaking, digital

literacy improves employability (Khan et al., 2022). People who do not have the ability to do digital tasks have the least opportunities to get jobs (One, 2017).

At the national level, China is undergoing a strategic transformation marked by the dual goals of building a "Digital China" and implementing an "employment-first" policy aimed at promoting high-quality and full employment (Xi, 2022). On one hand, many policies have been released to boost the digital economy, and the release of these policies signifies the urgent demand for a large number of digital talents. This means that individuals need to continuously improve their digital literacy levels to meet the needs of social development. On the other hand, the number of university and college graduates in China in 2024 reached a historic high. In addition, according to the 2024 University Students' Employability Survey (Dazhong News, 2024), liberal arts graduates had obtained the lowest proportion of employment offers, which makes "employability of liberal arts students" a matter of concern.

Traditional Liberal Arts programs in Chinese universities have emphasized cultivating humanistic qualities among students, with less focus on new technologies, including digital technologies. With the implementation of the "New Liberal Arts" policy, there has been increased attention to improving digital literacy among liberal arts students (Cheng, 2020). Nevertheless, there are still many issues related to curriculum design and the alignment of programs with societal needs (Liu & Hua, 2023).

"Motivational belief" is a broad concept that is heavily rooted in various motivation theories, particularly in educational psychology. It is often linked to theories like self-efficacy theory, expectancy-value theory, and so on. It encompasses various aspects, such as task value belief, goal orientation, intrinsic and extrinsic values, and others. Studies have demonstrated that motivational beliefs are essential for achieving success in digital learning and significantly contribute to improving digital literacy among university students (Huang et al., 2020; Anthonysamy et al., 2021; Lilian, 2022). Among the various motivational beliefs, technological self-efficacy, task value, and goal orientation have emerged as three key psychological constructs that influence the development of digital literacy (Anthonysamy et al., 2021; Lilian, 2022). Therefore, these three factors were selected in this study to examine their influence on digital literacy for employment among liberal arts university students, with the aim of proposing targeted recommendations for enhancing digital literacy.

1.2 Literature Review

1.2.1 Digital Literacy

The concept of digital literacy has evolved beyond technical competencies to include critical thinking, ethical responsibility, and social engagement (Pangrazio et al., 2020). Once narrowly associated with operational skills, it is now recognized as a dynamic, multifaceted construct shaped by rapid technological developments and shifting societal needs. Institutional definitions reflect this shift: the European Commission (2019) emphasizes intellectual and critical abilities, while UNESCO (2018) underscores the relevance of digital literacy in all aspects of life. The proliferation of AI, mobile technologies, and immersive environments has diversified the digital skills required for work, education, and daily living (Falloon, 2020; Vuorikari et al., 2022).

Increasingly, scholars acknowledge the contextual and sociocultural nature of digital literacy. It is understood as socially situated and influenced by regional, institutional, and cultural factors (Cetindamar Kozanoglu & Abedin, 2020). Studies have examined how digital literacy is conceptualized among various groups, such as students, teachers, and lifelong learners, each with distinct digital demands (Esteve-Mon et al., 2020; Marín & Castaneda, 2023). This diversity has led to the development of numerous frameworks worldwide.

Organizations such as UNESCO (2018), the European Commission (Vuorikari et al., 2022), and the DQ Institute (2021) have introduced comprehensive frameworks to support digital competency across sectors. In response, many countries have developed national-level models tailored to local contexts, such as Singapore's Unified Framework (Ei & Soon, 2021). At the institutional level, universities like Edith Cowan University and Macquarie University have established digital literacy strategies to enhance student learning and employability (Reddy et al., 2023). These developments reflect an ongoing effort to conceptualize digital literacy in ways that are adaptable, inclusive, and aligned with global digital transformation.

Among these frameworks, the Digital Competence Framework for Citizens (DigComp) is one of the most widely used. Developed by the Joint Research Centre (JRC) of the European Commission, it aims to improve citizens' digital competence (Vuorikari et al., 2016). The newest version, DigComp 2.2, was published in March 2022. DigComp outlines five key digital competence areas: Information and data literacy; Communication and

collaboration; Digital content creation; Safety; and Problem solving. While the framework is comprehensive, it was developed in a European context and may not fully capture cultural and contextual differences in digital use. Therefore, this study adopts the five core dimensions of DigComp as its analytical foundation but also makes minor adaptations to the questionnaire items to better reflect the local realities of college students in Chengdu, China. These modifications aim to enhance the framework's applicability in the regional context while maintaining conceptual consistency with DigComp.

1.2.2 Technological Self-Efficacy and Its Relationship with Digital Literacy

Self-efficacy refers to an individual's belief in their ability to succeed in specific situations or accomplish tasks (Bandura, 1977). In the context of technology, computer self-efficacy was first introduced by Davis and Gist (Compeau et al., 2015), and it describes people's confidence in their ability to use computers effectively (Khorrami-Arani, 2001). Technological self-efficacy, a broader term, includes confidence in using general technology and online learning platforms (An et al., 2022), and is considered an extension of general self-efficacy. In the digital age, technological self-efficacy has gained increasing importance, as it extends beyond traditional computer use to include mobile devices, cloud services, and AI-powered tools. Unlike computer self-efficacy, which focuses on specific technical operations, technological self-efficacy emphasizes one's adaptability, confidence, and problem-solving abilities in fast-evolving digital environments. This broader scope makes it a more relevant and comprehensive construct for assessing individuals' digital competence in educational and professional contexts today.

The relationship between technological self-efficacy and digital literacy is grounded in theories such as self-efficacy theory, self-determination theory, and expectancy-value theory. According to Bandura (1977), individuals with high self-efficacy tend to stay motivated, persist through challenges, and perform better, while those with low self-efficacy are more likely to doubt themselves and give up (Lilian, 2022). Research also shows that self-efficacy influences goal setting and learning achievement (Schunk & DiBenedetto, 2021). For example, students with higher self-efficacy are more likely to achieve better academic results (Lu & Tian, 2023), whether in physics, mathematics, or language learning (Dan et al., 2022).

Digital literacy is essential for university students. Numerous studies have examined the link between technological self-efficacy and digital literacy, especially in educational contexts. For instance, teachers' ICT self-efficacy significantly correlates with their digital literacy and integration of technology in classrooms (Kahveci, 2021). Similarly, students with higher technological self-efficacy are more capable of effectively using digital tools (Ulfert et al., 2022). Some studies even show a reciprocal relationship, with digital literacy also enhancing self-efficacy (Getenet et al., 2024). Although many studies affirm this positive relationship (Anthonysamy et al., 2020; Lilian, 2022), further research is still needed to deepen the understanding of this connection.

1.2.3 Task Value and Its Relationship with Digital Literacy

Task value, a key component of expectancy-value theory, refers to how individuals perceive the importance, usefulness, or value of a task (Lilian, 2022; Chiang et al., 2022). Eccles (1983) divides task value into four components: intrinsic value, utility value, attainment value, and cost. Intrinsic value relates to personal interest and aligns with intrinsic motivation in self-determination theory, while utility value aligns with extrinsic motivation (Anderman, 2020). Attainment value relates to one's identity or self-worth (Eccles & Wigfield, 2020), and cost refers to the negative aspects or perceived burdens that may lower motivation (Wang & Xue, 2022). This study focuses on the value components instead of the cost of improving digital literacy for employment. Therefore, intrinsic value, utility value, and attainment value are the three dimensions used in this study.

Expectancy-value theory suggests that task value influences academic choices, persistence, and performance (Eccles et al., 1983). Studies explore task value either holistically (Cai et al., 2022) or by analyzing each component (Li et al., 2021). Different components may lead to different academic outcomes (Robinson et al., 2019). For example, intrinsic value has been positively linked to language learning engagement (Bai & Wang, 2023).

Regarding digital literacy, task value has been found to positively correlate with students' digital competence and learning outcomes (Anthonysamy et al., 2020; Lilian, 2022). Gilbert (2019) found that students who valued digital literacy performed better and were more motivated. Intrinsic value especially supports the development of digital skills, such as social media literacy (Anistyasari et al., 2024). However, findings on utility

value are mixed. While some studies confirm a positive link between digital literacy and online learning motivation (Karakış, 2022), others, such as Jatmoko et al. (2023), report no strong relationship. These conflicting results may be influenced by varying contextual factors, including differences in technological infrastructure, cultural attitudes toward digital skills, or the specificity of digital tasks assessed. For example, in some settings, students may recognize the importance of digital literacy but feel overwhelmed by its demands, reducing motivation despite perceived utility. Additionally, the interplay between attainment value and cost remains underexplored. Understanding how students weigh the benefits against the effort and anxiety associated with digital learning is crucial, especially in diverse cultural and educational contexts where these perceptions may differ significantly. Further research is necessary to unpack these complexities.

1.2.4 Goal Orientation and Its Relationship with Digital Literacy

Goal orientation refers to the reasons or motivations behind how individuals approach and pursue goals, especially in academic contexts (Ames, 1992). Unlike focusing on what the goals are, goal orientation emphasizes why and how goals are set and achieved (Anderman & Maehr, 1994). The most frequently used model is a three-category model, namely, mastery goals, performance-approach, and performance-avoidance goals (Elliot & Church, 1997).

Since its introduction, goal orientation has been widely applied to understand achievement motivation across various domains, including education and social psychology (Vandewalle et al., 2019). Research consistently indicates that goal orientation can serve as a predictor of performance; however, findings are not always consistent across contexts. In workplace settings such as sales, a learning goal orientation has been linked to enhanced performance, while performance orientation appears to have no significant impact (Vandewalle et al., 1999). In educational contexts, mastery goals characterized by the desire to develop competence are generally associated with improved academic outcomes. However, the effects of performance-approach goals, which emphasize demonstrating competence relative to others, are mixed. For instance, Alhadabi and Karpinski (2020) found positive effects, while Hsieh et al. (2007) reported no significant relationship. These inconsistencies may be attributed to differences in how performance goals are operationalized, as well as variations in academic settings, student populations, or task types. Performance avoidance goals, which involve efforts to avoid failure, are more consistently associated with negative academic outcomes.

Furthermore, individual confidence plays a moderating role. When self-confidence is high, individuals respond adaptively regardless of their goal orientation. In contrast, those with low self-confidence only exhibit adaptive behavior if they adopt a learning orientation, underscoring the importance of perceived competence. In digital learning environments, goal orientation has also been found to influence digital literacy, with studies reporting a generally positive relationship (Anthonysamy et al., 2020; Lilian, 2022). However, most of these findings focus on general goal orientation rather than its subtypes. Given the mixed results for performance goals, future research should differentiate between mastery, performance-approach, and performance-avoidance goals when examining their impact on digital competence. This would help clarify the mechanisms through which goal orientation affects engagement and achievement in technology-enhanced learning.

Combining the above, it can be seen that there are differences in the results of studies on the relationship between technological self-efficacy, task value, goal orientation, and digital literacy. The differences in results may stem from variations in research contexts and subjects (Muenks et al., 2023). Therefore, more empirical studies could enrich the application of the theory.

2. Objectives

To examine the relationship between technological self-efficacy, task value, goal orientation, and digital literacy among liberal arts university students in Chengdu.

3. Materials and Methods

3.1 Research Design

This study employed a quantitative research design. Data for every variable were collected through a questionnaire survey.

3.2 Population and Samples

3.2.1 Population

The target population of the quantitative study was liberal arts university students in Chengdu, China. According to the enrollment numbers for liberal arts majors in undergraduate programs at universities in Chengdu for the year of 2021, 2022, 2023, and 2024, there were approximately 185,505 liberal arts university students in Chengdu in the year of 2024. Additionally, there were 29 undergraduate universities in Chengdu. Among them, there were 18 public universities and 11 private universities. Seven of the 18 public universities were "Double First-Class" universities.

3.2.2 Samples

In this study, Yamane's formula was used to calculate the sample size to ensure that the results are statistically significant. By using Yamane's formula, the calculated sample size for a population of 185,505 would be approximately 400. In practical terms, it would typically be rounded up to the nearest whole number, so the intended sample size for this study was 400.

A stratified random sampling method was used for sample selection. This method ensures that each subgroup is adequately represented, enhancing the precision and accuracy of the overall sample. For this study, the strata were based on university type (Double First-Class universities, regular public universities, private universities), and academic year (freshman, sophomore, junior, senior) to ensure representation from three different university types and four different academic years.

3.3 Data Collection

The data collection started from January 4, 2025, to January 8, 2025. Before distributing the questionnaires, the researcher transformed them into online survey forms and distributed them using online survey tool "Wenjuanxing", which is a popular online survey tool among Chinese university students. The researcher worked with faculty members and administrative staff to facilitate the distribution and collection of questionnaires within their institutions. A total of 431 questionnaires were collected. After excluding invalid responses, 400 valid questionnaires were selected.

3.4 Ethical Approval

This study has got the certificate of Approval by Ethics Review Board of Rangsit University. The certification number is COA. No. RSUERB2025-003.

3.5 Measures

The questionnaire consisted of five sections, including: (1) Demographic and academic information, (2) Technological Self-Efficacy Scale (TSE), (3) Task Value Scale (TV), (4) Goal Orientation Scale (GO), and (5) Digital Literacy Scale (DL). Demographic information included academic year, gender, discipline, and type of university. These variables were measured using nominal and ordinal scales.

To ensure the quality of the research instruments, content validity was first evaluated using the Item-Objective Congruence (IOC) index. Five subject matter experts, including three experts who majored in education, and two experts who majored in computer sciences, were invited to evaluate the items. According to the scores of the five experts, two items scored 0.6, three items scored 0.8, and 40 items scored 1. Although the mean values of the scores of all items were higher than 0.5, two items with scores of 0.6 were revised based on expert feedback.

Following the content validation, a pilot study was conducted to assess the internal consistency reliability of each scale. Thirty representative participants from three different university types and four different academic years, covering eight disciplines and both genders, participated in this pilot study of the questionnaire. The reliability coefficients for each scale were as follows: TSE: $\alpha = .836$, TV: $\alpha = .926$, GO: $\alpha = .861$, DL: $\alpha = .915$, and Total: $\alpha = .948$. Subsequently, after the formal distribution and collection of the questionnaires, a reliability analysis was conducted on 400 responses. The specific measures and Cronbach's α coefficient of each variable and dimension are shown in the following.

The first measure was the Technological Self-Efficacy (TSE) Scale, which consisted of 5 items adapted from two sources: the Technological Self-Efficacy Scale developed by Hopp and Gangadharbatla (2016), and the Computer Self-Efficacy Scale by Bellini et al. (2016). Both original instruments were developed for university

students. Items assessed students' confidence and curiosity in using and troubleshooting technology. Responses were rated on a 5-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). Internal consistency reliability (Cronbach's α) for this scale in the present study was high (α = .863).

The second measure was the Task Value (TV) Scale, consisting of 13 items derived and modified from the works of Hagemeier & Murawski (2014), and Robinson et al. (2019). The scale measured three dimensions of task value: (1) Intrinsic Value (IV), (2) Utility Value (UV), and (3) Attainment Value (AV). IV included 4 items assessing interest and enjoyment in digital literacy; UV contained 5 items evaluating the perceived usefulness of digital literacy for future success; and AV included 4 items measuring the personal importance of becoming digitally literate. All items were rated on a 5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree). Internal consistency coefficients were high for the Task Value Scale and all three subscales (TV: α = .898, IV: α = .852, UV: α = .882, AV: α = .857).

The third measure was the Goal Orientation (GO) Scale, based on the three-category model proposed by Elliot & Church (1997), and expanded upon by Elliot & Murayama (2008), and Midgley et al. (1998). It included 9 items assessing three dimensions of goal orientation: (1) Mastery Goals (MG), (2) Performance-Approach Goals (PAG), and (3) Performance-Avoidance Goals (AG). Each subscale included 3 items, all of which were answered using a 5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree). Internal reliability for the Goal Orientation Scale and the three subscales was strong (GO: α = .867, MG: α = .810, PAG: α = .817, AG: α = .815).

The fourth measure was the Digital Literacy (DL) Scale, which comprised 15 items adapted from the European Commission's Digital Competence Framework for Citizens (DigComp) and the DigComp Self-Assessment Tool (DigCompSAT). The scale was developed based on existing instruments from Clifford et al. (2020), Vuorikari et al. (2022), and Mieg et al. (2024). Digital literacy was measured across five core competence areas: (1) Information and Data Literacy (IDL), (2) Communication and Collaboration (CC), (3) Digital Content Creation (DCC), (4) Safety (S), and (5) Problem Solving (PS). Each area consisted of three items, and all were rated on a 5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree). This structure captured students' perceived knowledge, skills, and attitudes related to digital literacy in personal and professional contexts. The Digital Literacy scale and the five subscales demonstrated high internal consistency (DL: α = .897, IDL: α = .808, CC: α = .808, DCC: α = .814, S: α = .800, PS: α = .814).

After the reliability analysis, construct validity was then examined through Exploratory Factor Analysis (EFA). For digital literacy (15 items), the KMO was 0.894 and Bartlett's test was significant ($\chi^2 = 2593.44$, $p < 0.001$). Five factors were extracted, explaining 72.74% of the variance. For technological self-efficacy (5 items), the KMO was 0.862 and Bartlett's test was significant ($\chi^2 = 850.68$, $p < 0.001$), with one factor explaining 64.65% of the variance. For task value (13 items), the KMO was 0.911 and Bartlett's test was significant ($\chi^2 = 2606.76$, $p < 0.001$); three factors were extracted, accounting for 69.14% of the variance. For goal orientation (12 items), the KMO was 0.867 and Bartlett's test was significant ($\chi^2 = 2027.28$, $p < 0.001$), yielding three factors performance-approach, performance-avoidance, and mastery goals which explained 66.02% of the variance. All factor loadings exceeded 0.50, indicating strong construct validity across all scales.

3.6 Data Analysis

First, the frequency analysis of demographic variables serves to describe the fundamental characteristics and composition of the sample, assess its representativeness, and reveal differences among subgroups.

Second, in order to test the relationship between the dependent variable and the independent variables, this study used correlation analysis and multiple regression analysis.

For correlation analysis, the Pearson correlation coefficient was used to measure the degree and direction of the correlation between technological self-efficacy, task value, goal orientation, digital literacy, and their dimensions. When the value is near to +1 or -1, the relationship between technological self-efficacy, task value, goal orientation, and digital literacy for employment is strong. If the sign of the correlation coefficient is positive, the relationship is positive. If the sign is negative, the relationship is negative.

Multiple regression analysis was employed to explore the relationship between the three independent variables technological self-efficacy, task value, and goal orientation and one dependent variable digital literacy. A standard multiple linear regression using the enter method was employed, in which all three independent variables were entered into the model simultaneously based on theoretical considerations.

Third, analysis of variance (ANOVA) was used to determine whether there are significant differences between groups or categories within a dataset. This study employed one-way ANOVA to identify significant differences that may suggest important patterns or relationships.

4. Results

4.1 Frequency Analysis of Demographic Variables

The final sample consisted of 400 valid responses from liberal arts students in Chengdu. The majority were female (70.5%), with males comprising 29.5%. Grade distribution was relatively balanced across all four academic years. Participants came from "Double First-Class" universities (14.2%), regular public universities (44.8%), and private universities (41.0%). Disciplines were diverse, with the largest groups from economics (16.3%) and arts (16.0%), followed by education, literature, management, and law; fewer students were from philosophy and history (5.0% each). See Table 1 for details.

Table 1 Frequency Analysis of Demographic Variables (N=400)

Demographic Variable	Option	Frequency	Percentage
Gender	Male	118	29.5
	Female	282	70.5
Grade	Female	102	25.5
	Sophomore	102	25.5
	Junior	100	25
	Senior	96	24
University Type	"Double First-Class" University	57	14.2
	Regular Public University	179	44.8
	Regular Public University	164	41
Discipline	Literature	56	14
	History	20	5
	Philosophy	20	5
	Economics	65	16.3
	Management	60	15
	Law	56	14
	Education	59	14.8
	Arts	64	16

4.2 Correlation Analysis

4.2.1 Correlation between Digital Literacy and Technological Self-efficacy

As shown in Table 2, technological self-efficacy was found to have a significant positive correlation with overall digital literacy ($r = .472$, $p < .01$). Further analysis revealed significant positive correlations between technological self-efficacy and each dimension of digital literacy: information and data literacy ($r = .353$, $p < .01$), communication and collaboration ($r = .339$, $p < .01$), digital content creation ($r = .382$, $p < .01$), safety ($r = .327$, $p < .01$), and problem solving ($r = .374$, $p < .01$). These results suggest that higher levels of technological self-efficacy are associated with stronger digital literacy across all dimensions.

Table 2 Correlation between Digital Literacy and Technological Self-efficacy

	Digital Literacy (MV)	Information and Data Literacy (SD)	Communication and Collaboration (SD)	Digital Content Creation (SD)	Safety (SD)	Problem Solving (SD)
Technological Self-efficacy (MV)	.472**	.353**	.339**	.382**	.327**	.374**

** $p < 0.01$

"MV" stands for "Main Variable". "SD" stands for "Sub-dimension"

4.2.2 Correlation between Digital Literacy and Task Value

As shown in Table 3, task value was significantly positively correlated with overall digital literacy ($r = .597$, $p < .01$). Each dimension of digital literacy also showed significant positive correlations with task value, including information and data literacy ($r = .440$, $p < .01$), communication and collaboration ($r = .468$, $p < .01$), digital content creation ($r = .490$, $p < .01$), safety ($r = .386$, $p < .01$), and problem solving ($r = .461$, $p < .01$). Furthermore, overall digital literacy was positively correlated with intrinsic value ($r = .422$, $p < .01$), utility value ($r = .459$, $p < .01$), and attainment value ($r = .569$, $p < .01$). These findings indicate that task value and its sub-dimensions are positively associated with digital literacy.

Table 3 Correlation between Digital Literacy and Task Value

	Digital Literacy (MV)	**Information and Data Literacy (SD)**	**Communication and Collaboration (SD)**	**Digital Content Creation (SD)**	**Safety (SD)**	**Problem Solving (SD)**
Task value (MV)	.597**	.440**	.468**	.490**	.386**	.461**
Intrinsic Value (SD)	.422**	.286**	.342**	.340**	.250**	.366**
Utility Value (SD)	.459**	.328**	.354**	.396**	.295**	.350**
Attainment Value (SD)	.569**	.455**	.442**	.448**	.390**	.405**

** $p < 0.01$

"MV" stands for "Main Variable". "SD" stands for "Sub-dimension".

4.2.3 Correlation between Digital Literacy and Goal Orientation

As shown in Table 4, goal orientation was found to have a significant positive correlation with overall digital literacy ($r = .570$, $p < .01$). Each dimension of digital literacy information and data literacy ($r = .433$), communication and collaboration ($r = .410$), digital content creation ($r = .436$), safety ($r = .427$), and problem solving ($r = .438$) also showed significant positive correlations with goal orientation (all $p < .01$). In terms of sub-dimensions, mastery goals ($r = .436$, $p < .01$) and performance-approach goals ($r = .494$, $p < .01$) were positively correlated with digital literacy, while performance-avoidance goals showed a significant negative correlation ($r = –.464$, $p < .01$).

Table 4 Correlation between Digital Literacy and Goal Orientation

	Digital Literacy (MV)	**Information and Data Literacy (SD)**	**Communication and Collaboration (SD)**	**Digital Content Creation (SD)**	**Safety (SD)**	**Problem Solving (SD)**
Goal Orientation (MV)	.570**	.433**	.410**	.436**	.427**	.438**
Mastery Goals (SD)	.436**	.344**	.317**	.327**	.321**	.331**
Performance-Approach Goals (SD)	.494**	.375**	.337**	.390**	.370**	.387**
Performance-Avoidance Goals (SD)	-.464**	-.340**	-.349**	-.350**	-.354**	-.354**

** $p < 0.01$

"MV" stands for "Main Variable". "SD" stands for "Sub-dimension".

4.3 Multiple Regression Analysis

The correlation analysis revealed that there are significant relationships between variables. To further understand the influence among variables, multiple regression analysis was conducted to explore the impact of independent variables on the dependent variables. Before conducting the regression analysis, multicollinearity was examined. The Variance Inflation Factor (VIF) values for all independent variables were well below the commonly accepted threshold of 5, indicating no serious multicollinearity. Specifically, the VIF values were 1.284 for technological self-efficacy, 1.488 for task value, and 1.465 for goal orientation, with all tolerance values above 0.6.

The results from multiple regression analysis show that goal orientation ($\beta = .303$, $p < .001$), technological self-efficacy ($\beta = .203$, $p < .001$), and task value ($\beta = .353$, $p < .001$) significantly impact digital literacy. The model explains 47.9% of the variance in digital literacy ($R^2 = .479$, $F = 121.482$, $p < .001$), indicating

good model fit. Among the predictors, task value had the strongest influence, followed by goal orientation and technological self-efficacy. This suggests that all three variables play a significant role in shaping digital literacy among liberal arts students. Task value was the strongest predictor, possibly because liberal arts students are more likely to engage in digital learning when they see its direct relevance to their future careers. See Table 5 and Table 6 for details.

Table 5 Model Summary

Model	R	R^2	Adjusted R^2	Std. Error of the Estimate
1	0.692	0.479	0.475	0.585

Predictor variables: (constant), goal orientation, technological self-efficacy, task value.

Table 6 Regression Coefficients Table for Digital Literacy

Variable	Non-standardized Coefficient		Standardized Coefficient	t-value	p-value	Collinearity statistics	
	B	Std. Error	β			Tolerance	VIF
（Constant）	0.786	0.142		5.521	0.000		
Technological Self-efficacy	0.165	0.033	0.203	4.941	0.000	0.779	1.284
Task Value	0.337	0.042	0.353	7.973	0.000	0.672	1.488
Goal Orientation	0.279	0.040	0.303	6.901	0.000	0.683	1.465

Dependent Variable：Digital Literacy，F =121.482，p ＜0.001

4.4 Variance Analysis

4.4.1 One-Way ANOVA for the Effect of Grade Level on Variables

A one-way ANOVA was conducted to examine differences across grade levels in four variables. Results showed significant grade-level differences in digital literacy (F = 6.632, p = 0.000), technological self-efficacy (F = 3.947, p = 0.009), and task value (F = 3.115, p = 0.026). Digital literacy and task value increased with grade level, with senior students scoring highest. Sophomore students reported the highest technological self-efficacy. However, goal orientation showed no significant difference (F = 0.942, p = 0.420), indicating its relative stability across grades. See Table 7 for details.

Table 7 One-Way ANOVA for the Effect of Grade Level on Variables

Variable	Grade	Sample Size	Mean	Standard Deviation	F	p
Digital Literacy	Freshman	102	3.197	0.904	6.632	0.000
	Sophomore	102	3.438	0.753		
	Junior	100	3.462	0.776		
	Senior	96	3.698	0.711		
Technological Self-efficacy	Freshman	102	3.147	1.064	3.947	0.009
	Sophomore	102	3.612	0.839		
	Junior	100	3.34	1.025		
	Senior	96	3.435	0.995		
Task Value	Freshman	102	3.22	0.967	3.115	0.026
	Sophomore	102	3.391	0.783		
	Junior	100	3.494	0.852		
	Senior	96	3.559	0.722		
Goal Orientation	Freshman	102	3.295	0.995	0.942	0.420
	Sophomore	102	3.405	0.853		
	Junior	100	3.432	0.84		
	Senior	96	3.5	0.799		

4.4.2 One-Way ANOVA for the Effect of University Type on Variables

A one- way ANOVA was conducted to examine differences across university types. Results showed no significant differences in digital literacy (F = 0.579, p = 0.561), technological self-efficacy (F = 0.007, p = 0.993), or task value (F = 0.210, p = 0.811). However, goal orientation differed significantly (F = 4.395, p = 0.013), with students from " Double First- Class" universities reporting higher levels than those from general or private universities. This suggests that university type significantly influences goal orientation, but not the other three variables. See Table 8 for details.

Table 8 One-Way ANOVA for the Effect of University Type on Variables

Variable	University Type	Sample Size	Mean	Standard Deviation	*F*	*p*
Digital Literacy	"Double First-Class" University	57	3.544	0.82	0.579	0.561
	Regular Public University	179	3.445	0.807		
	Private University	164	3.41	0.804		
Technological Self-efficacy	"Double First-Class" University	57	3.393	0.954	0.007	0.993
	Regular Public University	179	3.386	1.01		
	Private University	164	3.377	0.998		
Task Value	"Double First-Class" University	57	3.425	0.819	0.210	0.811
	Regular Public University	179	3.439	0.873		
	Private University	164	3.381	0.824		
Goal Orientation	"Double First-Class" University	57	3.612	0.801	4.395	0.013
	Regular Public University	179	3.474	0.88		
	Private University	164	3.262	0.879		

5. Discussion

5.1 Theoretical and Educational implication

5.1.1 The Significant *and Positive Relation between Technological Self-Efficacy and Digital Literacy*

This study found a significant positive relationship between technological self-efficacy and digital literacy, consistent with prior research that highlights the role of self-efficacy in promoting engagement with digital tools (Bandura, 1997). Studies have shown that individuals with high technological self-efficacy are more likely to explore digital technologies, persevere through challenges, and incorporate digital skills into their academic and professional lives (Kahveci, 2021).

From an employment perspective, this relationship emphasizes the necessity of fostering technological self-efficacy among liberal arts students. As the job market increasingly requires digital competencies, students confident in their technological abilities are more likely to develop and apply digital skills relevant to future careers (Van Laar et al., 2017). Skills such as data analysis, digital communication, and online content creation rely on both competence and confidence in using digital tools. Without self-efficacy, students may avoid engaging with these tasks, reducing their employability.

To address this, higher education institutions in Chengdu should implement initiatives that enhance technological self-efficacy. Strategies may include hands-on digital training, involvement in real-world digital projects, and supportive learning environments that promote experimentation with digital tools (Lilian, 2022). In addition to traditional approaches, institutions can also leverage peer mentoring programs, gamified learning platforms, and AI-powered adaptive learning systems to personalize skill development and boost students' confidence in digital contexts. Such measures can equip students with the confidence and capabilities required in today's digitally-driven labor market.

5.1.2 The Significant and Positive Relation between Task Value and Digital Literacy

The study also revealed a significant positive correlation between task value and digital literacy, reinforcing the idea that perceived task value strongly influences learning motivation (Anthonysamy et al., 2020; Lilian, 2022). When students recognize the importance and relevance of digital literacy, they are more likely to engage with learning tasks and achieve better outcomes. For instance, Gilbert (2019) found that students who perceive high task value report greater satisfaction and performance in digital learning contexts.

For liberal arts students in Chengdu, enhancing the perceived value of digital skills is crucial in motivating them to acquire competencies aligned with the evolving demands of the job market. To remain competitive, students must develop digital skills that are valued across industries.

Universities can increase task value by designing a curriculum that clearly links digital skills to career outcomes. Engaging, goal-oriented courses can help students recognize how digital literacy enhances their future job prospects. Additionally, educators can employ contextualized teaching strategies, such as using digital tools to solve real-world problems (Yuan, 2025), which increase engagement and help students connect classroom learning to practical applications. Beyond traditional interventions, universities can also introduce interdisciplinary digital challenge competitions, alumni mentorship programs, and digital storytelling projects that encourage students to creatively apply their skills in meaningful, career-relevant contexts.

5.1.3 The Significant and Positive Relation between Goal Orientation and Digital Literacy

The study further revealed that digital literacy is significantly related to goal orientation, particularly mastery and performance approach goals, while negatively correlated with performance avoidance goals. These findings are in line with the literature on motivation and academic achievement (Elliot & Church, 1997). Mastery goals promote intrinsic motivation, persistence, and a focus on personal growth, while performance approach goals are linked to extrinsic motivation and achievement through external recognition. In contrast, performance avoidance goals are associated with lower engagement and academic outcomes (Alhadabi & Karpinski, 2020).

Anthonysamy et al. (2020) and Lilian (2022) similarly found that goal orientation significantly contributes to digital literacy development. Students with mastery and performance approach orientations are more likely to succeed, while those with avoidance goals are at risk of disengagement.

In practice, educators should foster mastery-oriented learning environments that emphasize individual growth over competition. Helping students understand the long-term value of digital skills for career advancement can promote sustained engagement. Although performance approach goals can positively influence digital literacy, excessive reliance on external comparison may shift students' focus away from meaningful learning. Educators can help by aligning performance goals with mastery goals through career-linked tasks such as digital portfolios, certifications, or internships.

For students with performance avoidance tendencies, reducing fear of failure is key. Creating supportive environments where mistakes are normalized as part of the learning process can help students build resilience. Setting progressive goals can also help students gradually build their skills and confidence without being overwhelmed. Besides, institutions can implement reflective goal-setting workshops, digital learning journals, and AI-powered feedback tools that adaptively support students' motivational needs and promote a growth-oriented mindset.

5.1.4 The Effect of Grade Level and University Type on Digital Literacy, Technological Self-Efficacy, Task Value, and Goal Orientation

This study found significant differences across grade levels in digital literacy, technological self-efficacy, and task value. Senior students scored highest in digital literacy and task value, while sophomores exhibited the highest technological self-efficacy. Goal orientation remained stable across grades. University type significantly influenced goal orientation only, with students from "Double First-Class" universities showing higher levels compared to general and private universities, highlighting the role of institutional resources and culture.

These results indicate that traditional liberal arts education in China still struggles to effectively integrate digital competencies, despite the "New Liberal Arts" policy aiming to improve digital literacy (Cheng, 2020). Curriculum design and alignment with societal and labor market needs remain challenges (Liu & Hua, 2023).

To better support students, universities should implement grade-specific digital literacy interventions, such as foundational digital skills training for lower-year students and interdisciplinary projects or internships for seniors to enhance practical experience. Differences in university resources could be mitigated by promoting inter-university collaborations, open-access digital courses, and shared platforms to ensure equitable learning opportunities.

Additionally, curriculum reform should focus on embedding digital literacy components across a wider range of liberal arts courses, rather than limiting them to specialized electives. Universities should also establish

mechanisms for regular consultation with industry stakeholders to ensure that program content remains responsive to evolving job market requirements.

These innovative, targeted strategies can improve liberal arts students' digital skills and motivation, thereby better preparing them for future careers in an increasingly digital workforce.

5.2 Limitations and Recommendations for Future Research

This study examined the development of digital literacy among liberal arts students in Chengdu. Future research could expand on these findings by conducting comparative analyses across both regions and academic disciplines. Comparing liberal arts students in Chengdu with those in other regions may reveal regional disparities and contextual factors that influence digital literacy, offering insights for localized educational policies. Additionally, contrasting liberal arts students with those in STEM or other fields can help identify how disciplinary characteristics shape digital literacy development. Such comparative studies would enable the formulation of more targeted strategies and practical recommendations for enhancing digital literacy education across diverse educational and regional contexts.

As this study adopted a cross-sectional design, the relationships identified between motivational beliefs (technological self-efficacy, task value, and goal orientation) and digital literacy reflect associations rather than causal effects. Therefore, caution should be exercised when interpreting the direction of influence among these variables. To establish clearer causal inferences, future research is recommended to employ longitudinal or experimental designs.

6. Conclusion

In the context of China's digital transformation and rising employment pressures, particularly for liberal arts students, this study highlights the crucial role of motivational beliefs technological self-efficacy, task value, and goal orientation in enhancing digital literacy for employment. The findings demonstrate that students with higher confidence in their digital abilities, a stronger perception of the value of digital skills, and goal-oriented learning attitudes are more likely to develop digital competencies that are vital for today's labor market. These insights offer both theoretical and practical implications: they reinforce motivational theory in the digital learning context and point to the urgent need for educational institutions to integrate motivation-enhancing strategies into curriculum design. To improve digital literacy for employment, universities should implement interventions that not only build students' technical confidence, but also make the relevance of digital skills to future careers more visible. Promoting mastery-oriented environments and reducing fear of failure can further support students, especially those with performance-avoidance tendencies. Ultimately, improving digital literacy among liberal arts students requires a multifaceted approach that connects motivation, education, and employability in a meaningful and sustainable way.

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