The Influence of Internet Embedding and Higher Vocational Students' Sustainable Entrepreneurial Intentions in Qinghai Province, China: Role of Practical Learning and AI Literacy

Lei Li*
Ke Zhang**

Abstract

Sustainable entrepreneurship is an important activity that drives the economy, and internet embedding, as the connection between individuals and the outside world, may be related to sustainable entrepreneurship. Therefore, combining self-determination theory and social network theory, this study collected a sample of 1,058 higher vocational students from 5 vocational schools in Qinghai Province, China, through an electronic questionnaire, and investigated the relationship between internet embedding and sustainable entrepreneurial intentions of higher vocational students, as well as the mediating effect of practical learning, and AI literacy as the boundary condition of the mechanism of internet embedding to sustainable entrepreneurial intentions of higher vocational students. The results showed that internet embedding was positively correlated with sustainable entrepreneurial intentions of higher vocational students, practical learning had a mediating effect, and AI literacy moderated the direct effect of internet embedding on practical learning and the indirect effects of AI literacy on sustainable entrepreneurial intentions of higher vocational students through practical learning in Qinghai Province, China. This suggests that higher vocational students in Qinghai Province, China, not only need to establish individual connections to the outside world but also need to incorporate entrepreneurial experiential learning and the comprehensive quality of AI collaboration to adequately stimulate their state of mind to participate in sustainable entrepreneurship in the future. Finally, the results of this study can contribute to the important field of sustainable entrepreneurship for future entrepreneur groups and higher vocational students in Qinghai Province, China, both in theory and practice.

Keywords: Internet Embedding; Sustainable Entrepreneurial Intentions; Practical Learning; AI Literacy

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* International College, Mahanakorn University of Technology, 10600, Thailand. Email: lileijx@163.com
** Chinese International College, Dhurakij Pundit University, Bangkok 10210, Thailand. (Corresponding Author) Email: zhangkedpu@gmail.com

Introduction

In contemporary times, how to balance environmental and social issues while developing the economy has become a major issue to be considered in China's economic development (Li & Long, 2024; Peng & Pan, 2024; Wang & Ye, 2024). Sustainable entrepreneurship is an important means to promote the development of the commonwealth and is an important activity to ensure that China's economic development is balanced with social and environmental issues (Lu et al., 2024; Shenmiao & Kamruddin, 2024; Zhang & Ji, 2024). For example, Nike's new generation of old shoes grinds recycled old shoes into particles and has built 42 environmentally friendly sports fields in China, with a goal of 100 by 2030, forming a product recycling infrastructure loop (Staikos & Rahimifard, 2007). However, the process by which sustainable entrepreneurial intentions are formed is still poorly understood (Baber, 2024; Lediana et al., 2023; Malhotra & Kiran, 2024). Therefore, there is an urgent need to explore the formation of sustainable entrepreneurial intentions to drive future long-term development (Baber et al., 2024; Jimenez & Harc, 2024; Sharma et al., 2024).

The rapid development of the internet has intensified the complexity and instability of the economic environment (Song et al., 2024; Wang et al., 2024a; Zhou & Cen, 2024). Therefore, how entrepreneurs can seize market opportunities by adapting to the external environment in the context of the internet economy, thus avoiding competitive threats and achieving effective resource integration, has become an urgent problem for their survival and development (Liu, 2024; Qin, 2024; Wan et al., 2024). Meanwhile, Wang et al. (2024b) emphasized that with the development of the internet, entrepreneurs' access to information and content has been enriched, and the internet embedding approach has become the main way for entrepreneurs to expand their social networks, obtain information and resources, and is also an effective way to help them gain social recognition and legitimacy (Duong et al., 2024; Ireta-Sanchez, 2024). On the other hand, internet embedding is positively associated with entrepreneurial intentions (Wu, 2021). In turn, this individual-embeddedness has been defined as the process by which an individual is bound by relational forces from social, psychological, and economic sources in the use of the internet, and establishes connections with other individuals or organizations on the internet (Liu et al., 2016). As stated by Yuan et al. (2024), in the field of entrepreneurship, social networks are the means of resource acquisition for entrepreneurs, and their value is mainly in communication and access to information resources (Anubhav et al., 2024; Fernandez et al., 2024; Thelma et al., 2024). In addition, with the global need for long-term ecological and environmental development, the will for sustainable entrepreneurship intentions has arisen, it has been described as a state of mind that demonstrates an individual's belief in and commitment to building a new business venture in the future that creates economic, social, and environmental value (Agu et al., 2021). Meanwhile, Srivastava et al. (2024) pointed out that sustainable entrepreneurial intentions are an important starting point for entrepreneurs to engage in sustainable entrepreneurship, and that understanding the mechanisms by which it is formed can help to provide more guidance to educators and policymakers on how to foster sustainable entrepreneurial intentions in individuals (Kayal, 2024; Lopes et al., 2024; Makuya & Changalima, 2024). Although, internet embedding is associated with entrepreneurial intentions (Wu, 2021). However, the relationship between internet embedding and sustainable entrepreneurial intentions of higher vocational students has never been explored. Therefore, exploring the influencing factors of the higher vocational students' sustainable entrepreneurial intentions in Qinghai Province, China, is of great significance for promoting their sustainable entrepreneurship in the future, accelerating sustainable development, and promoting high-quality economic development in the region.

Furthermore, practical learning by doing may be an important medium in the process of sustainable entrepreneurial intention formation. It has been described as entrepreneurs engaging in experiential learning during real-life activities (Ramsgaard & Østergaard, 2018). Research has shown that internet embedding is positively correlated with exploitive learning (Yao et al., 2020). As stated by Liu et al. (2016), entrepreneurs use the internet to communicate with their partners, have access to industry information, and dynamics, and also use the internet to facilitate the process of entrepreneurial learning. On the other hand, the study by Jia et al. (2023) also confirms that practical learning can mediate the relationship between Internet embedding and the performance of new ventures. As Li (2024) suggests, the Internet not only expands sales channels and identifies new business opportunities, but also enhances feedback on user experience, helps upgrade products or services, and better assists entrepreneurs in reaching their entrepreneurial goals. Meanwhile, Taneja et al. (2024) emphasize that due to the lack of resources for sustainable entrepreneurship, students need to learn to identify opportunities and acquire knowledge, which in turn leads to the acquisition of knowledge and skills required for entrepreneurship, as well as external resources, which can help to further promote the development of their sustainable entrepreneurial intentions. Although, both internet embedding and practical learning are beneficial for entrepreneurship development (Jia et al., 2023; Ramsgaard & Østergaard, 2018). However, the mediating role of practical learning between internet embedding and higher vocational students' sustainable entrepreneurial intentions has never been explored. Therefore, exploring the intermediary role of higher vocational students' practical learning between internet embeddedness and sustainable entrepreneurial intentions is of great value to further promote their participation in sustainable entrepreneurial activities in the future in Qinghai Province of China, improve the local economic development model, and further promote the economic growth of the region.

Li et al. (2025) proposed that individuals' AI literacy in technology understanding, critical evaluation, and practical application can promote the improvement of dual learning, which is an important moderating factor in promoting exploratory and exploitative learning for entrepreneurs. Therefore, it is also defined as the comprehensive quality of knowledge and skills, attitudes, and ethics that individuals need to possess when collaborating with AI (Shi & Mao, 2024). Research has shown that internet embedding is positively correlated with entrepreneurial competence (Xiao et al., 2019). As stated by Ullrich and Messerschmidt (2024), internet embedding enables entrepreneurs to have an unprecedented increase in social links, and the function of these network links in transmitting, pooling, and diffusing knowledge will enhance their online knowledge transfer and innovation capabilities; furthermore, as a proprietary relational investment, internet embedding provides entrepreneurs with important social capital for their innovation practices, and this provides them with the opportunity to acquire the knowledge they need for innovation, capital and provide the possibility to access entrepreneurial resources and enhance their capabilities (Fischer & Reuber, 2014; Kumar & Sangwan, 2024; Walter, 2024). Meanwhile, Tzirides (2024) emphasized that the popularity of the internet and the convergence of AI technologies have made AI literacy the basis for individuals to adapt and create in the smart era (Gee & Zhang, 2024; Southworth et al., 2023). On the other hand, research has also found that AI literacy facilitates the relationship between environmental attention and ambidextrous learning (Li et al., 2025). As stated by Jia et al. (2023), the deep embeddedness of the internet has driven the application and development of digital technologies, enhancing entrepreneurs' ability to analyze and utilize complex information, which greatly contributes to the probability of entrepreneurial success (Song et al., 2024). Meanwhile, Li (2024) emphasizes that AI literacy has become an indispensable competency for individuals in the smart era, and is the key to entrepreneurial success. However,

internet embedding with AI literacy and entrepreneurial learning are all beneficial for entrepreneurship development (Jia et al., 2023; Lin et al., 2024; Wu, 2021). However, the facilitating role of AI literacy between internet embedding and higher vocational students' practice learning, and the boundary conditions of AI literacy where internet embedding translates into practice learning and thus influences higher vocational students' sustainable entrepreneurial intentions have never been explored. Therefore, exploring the moderating effect of higher vocational students' AI literacy between internet embedding and practical learning has certain research contributions to higher vocational students' promoting practical learning, improving their comprehensive ability and belief in Qinghai Province of China, and further strengthening the implementation of sustainable entrepreneurial action by future entrepreneurs.

On the other hand, Qinghai Province in China is a grazing area with an underdeveloped economy, and one of the main reasons for its economic backwardness is the lack of sustainable entrepreneurship (Jiang & Li, 2005). As Sun et al. (2024) pointed out, the support of relevant departments in Qinghai Province, China, for sustainable entrepreneurship is very low, which limits the long-term development of the regional economy. Therefore, this study will explore the antecedents and indirect mechanisms that can drive sustainable entrepreneurial intentions based on Qinghai Province, China, in order to promote the future development of sustainable entrepreneurship in the region. In addition, as the enrolment scale of China's higher vocational education expands, the employment pressure on graduates is also increasing, and society's preference for higher education further contributes to their overall low employment quality (Guan & Blair, 2024; Jin, 2024; Peng et al., 2024). Meanwhile, the rise of AI technology has given rise to more and more online entrepreneurship, but the entrepreneurial enthusiasm of higher vocational students is still low (Huang, 2024; Jiang & Al-Shaibani, 2024; Zhang, 2023). In addition, recent research shows that in 2022, the self-employment rate of higher vocational graduates in Qinghai Province of China will be 0.69% (Qinghai Province of China Department of Education, 2023), which greatly limits the long-term development of the local economy in the future (Gao & Zhang, 2024; Li & Kang, 2024; Wang et al., 2024c). Therefore, in this context, how to promote the participation of higher vocational students in sustainable entrepreneurship practices in Qinghai Province, China, is an important topic that needs to be addressed urgently.

In summary, the purpose of this study is to investigate the perceptions of Chinese senior vocational students in Qinghai Province on internet embedding, as well as to observe their level of sustainable entrepreneurship intentions, and the mediating and facilitating effects of practical learning and AI literacy. Clarifying these relationships will be beneficial to further enhance the formation of sustainable entrepreneurial intentions among Chinese senior vocational students in Qinghai Province bring rationale and contribution and promote the in-depth development of the theory.

Literature Review and Hypothesis Development

Self-determination theory

According to self-determination theory (Ryan & Deci, 2000, 2019), information inputs from the environment and individuals' competence needs can interact to influence behavioral intentions (Li et al., 2025; Xiao et al., 2019). Therefore, with the help of self-determination theory, this study defines internet embedding as an individual's use of the internet, which is subject to relational forces from social, psychological, and economic sources, and the

establishment of connections with other individuals or organizations in the internet (Liu et al., 2016), which is categorized as information input. In addition, this study defines practical learning as entrepreneurs' experiential learning in real-life activities (Ramsgaard & Østergaard, 2018), categorized as competency needs. On the other hand, this study defines sustainable entrepreneurial intentions as an individual's beliefs and commitments to establish a new business venture in the future that creates economic, social, and environmental value (Agu et al., 2021), categorized as behavioral intentions. Therefore, internet embedding and practical learning can act on sustainable entrepreneurial intentions.

Social network theory

According to self-determination theory (Ryan & Deci, 2000, 2019), information inputs from the environment and individuals' competence needs can interact to influence behavioral intentions (Li et al., 2025; Xiao et al., 2019). Therefore, with the help of self-determination theory, this study defines internet embedding as an individual's use of the internet, which is subject to relational forces from social, psychological, and economic sources, and the establishment of connections with other individuals or organizations in the internet (Liu et al., 2016), which is categorized as information input. In addition, this study defines practical learning as entrepreneurs' experiential learning in real-life activities (Ramsgaard & Østergaard, 2018), categorized as competency needs. On the other hand, this study defines sustainable entrepreneurial intentions as an individual's beliefs and commitments to establish a new business venture in the future that creates economic, social, and environmental value (Agu et al., 2021), categorized as behavioral intentions. Therefore, internet embedding and practical learning can act on sustainable entrepreneurial intentions.

Sustainable entrepreneurial intentions

Traditionally, entrepreneurial intentions have been described as the tendency to establish new businesses (Dabbous & Boustani, 2023). Whereas, with the global need for ecological and green development, sustainable entrepreneurial intentions have been formed (Malhotra & Kiran, 2024; Sharma et al., 2024), which is also defined as an individual's belief in, and commitment to, establishing a new business venture in the future that creates economic, social, and environmental value (Agu et al., 2021).

Internet embedding and higher vocational students' sustainable entrepreneurial intentions

When entrepreneurs are more deeply immersed in the internet, the online environment they are in becomes a powerful social and information exchange platform, and this highly embedded state helps entrepreneurial individuals to further accumulate social capital and knowledge resources, which positively contributes to the initiation of entrepreneurial intentions (Song et al., 2024). This individual connection with the outside world is also defined as an individual's use of the internet, which is subject to relational forces from social, psychological, and economic sources, and the establishment of connections with other individuals or organizations on the internet (Liu et al., 2016). On the other hand, studies have also found that internet embedding is positively correlated with entrepreneurial intentions (Wu, 2021). As Yuan et al. (2024) suggest, deeper internet embedding enables individuals to have more connections and more frequent interactions in their social networks, which increases the opportunities for individuals to be exposed to and assimilate new knowledge and skills, which will enhance the entrepreneurial beliefs of college students and stimulate their potential actions to engage in entrepreneurship in the future (Ireta-Sanchez, 2024; Yuan et al., 2024). In addition, sustainable entrepreneurial intentions are described as a state of mind that indicates an

individual's belief in and commitment to establishing a new business venture in the future that creates economic, social, and environmental value (Agu et al., 2021). The internet is an important social factor that can build a platform for potential entrepreneurs to communicate and exchange information, effectively improve the efficiency of collecting and exchanging market information, and reduce the information barriers to entrepreneurship, as well as integrating social and financial resources to provide them with the key resources they need to enhance entrepreneurs' confidence in their entrepreneurial success, which can in turn lead to a strong entrepreneurial intention (Wu, 2021; Zhang et al., 2020). Therefore, internet embedding, from resource acquisition to competence development to psychological motivation, provides a favorable environment and conditions for students (Song et al., 2024). Therefore, when the degree of Internet embedding is high, the entrepreneurial barriers are easily broken down, which puts them in a relatively favorable position, thus reinforcing their entrepreneurial beliefs (Zhang et al., 2020), and stimulating their sustainable entrepreneurial intentions.

In addition, in the process of sustainable entrepreneurship, entrepreneurs can enhance their ability to access resources through social networks, provide them with more critical information, and increase their confidence in responding to unexpected situations (Wu, 2021). This enables internet embeddedness to effectively enhance the higher vocational students' sustainable entrepreneurial intentions, promote future entrepreneurs to better adapt to changes in the external environment, and thus improve their participation in the formation of sustainable entrepreneurial actions in the future. On the other hand, internet embeddedness can also provide more entrepreneurial objects for sustainable entrepreneurs to refer to, help them quickly transform information and increase their knowledge reserves in the process of communication and interaction with other subjects, which further establishes the higher vocational students' sustainable entrepreneurship belief (Ireta-Sanchez, 2024; Zhang et al., 2020), promotes the practice of future entrepreneurs participating in sustainable entrepreneurial activities, and has important value for improving the future sustainable economic development of Qinghai Province, China, and reversing the backward enterprise economic model. Hence the hypothesis:

H1: Internet embedding and positively affects higher vocational students' sustainable entrepreneurial intentions.

The mediator role played by practical learning

One possible factor that can mediate the relationship between internet embedding and sustainable entrepreneurial intentions of higher vocational students is practical learning. According to Ramsgaard and Østergaard (2018), practical learning is the experiential learning that entrepreneurs engage in real-life activities, which contributes to entrepreneurial practices (Xu & Huang, 2024). Research has also found that internet embedding is positively associated with exploitive learning (Yao et al., 2020). As Yang et al. (2020) suggest, internet embedding can provide entrepreneurs with a lot of opportunities to get in touch with the outside world, which can help them familiarise themselves with the industry environment during entrepreneurial learning and practice, and thus enhance the effectiveness of practical learning. On the other hand, practical learning by doing is an important way of transforming the information and resources that entrepreneurs obtain on the internet (Taneja et al., 2024). As Li (2024) suggests, learning by doing can enrich entrepreneurs' experience and effectively integrate resources needed for entrepreneurship, which is a necessary way to improve their capabilities and lay a solid foundation for the successful development of entrepreneurial activities. In addition, Jia et al.'s (2023) study also found that practical learning by doing

mediates the relationship between internet embedding and the performance of new ventures. This is because internet embedding can facilitate entrepreneurs' full contact with external information, broaden their relationship network, accelerate the speed of acquiring entrepreneurial practice learning, and enhance the acquisition of knowledge, which is conducive to the acquisition of diversified resources and the strengthening of entrepreneurial beliefs (Xu & Huang, 2024; Yao et al., 2020), which will further stimulate the sustainable entrepreneurial intentions of the higher vocational students. Hence the hypothesis:

H2: Practical learning has a positive mediating effect between internet embedding and higher vocational students' sustainable entrepreneurial intentions.

The moderator role played by AI literacy

AI literacy may be a factor that moderates the relationship between internet embedding and sustainable entrepreneurial intentions of higher vocational students. Research has found that internet embedding is positively associated with entrepreneurial competence (Xiao et al., 2019). It is also considered the comprehensive quality of knowledge and skills, attitude, and ethics that individuals need to possess when collaborating with AI (Shi & Mao, 2024). Individuals with higher AI literacy are better able to understand and apply AI technology, which leads to the identification of more opportunities and effective use of technological resources in entrepreneurial processes, and can help entrepreneurs acquire information, integrate resources, and create value more efficiently (Li et al., 2025).

As a facilitating mechanism, AI literacy has also been found to interact with environmental attention to jointly stimulate ambidextrous learning (Li et al., 2025). As stated by Yi (2024), AI literacy enhances individuals' digital action and content creation abilities, improves their employment adaptability, and facilitates the role of indirect mechanisms such as entrepreneurial opportunity identification, helping entrepreneurs to carry out their entrepreneurial activities more efficiently (Cai et al., 2024; Kumar & Sangwan, 2024). Meanwhile, Zhang and Jia (2024) argued that human-computer collaboration in AI literacy enhances entrepreneurs' job adaptability, making them more resilient in the face of technological change and more likely to succeed (Li & Tong, 2024; Zhou et al., 2024). Therefore, the interaction between internet embedding and AI literacy not only enables entrepreneurs to better access multiple resources, expand opportunities, and enhance their abilities but also helps them better adapt to the rapidly changing market environment, thus promoting the formation of sustainable entrepreneurial intentions among higher vocational students. Hence the hypothesis:

H3: AI literacy has a positive moderating effect between internet embedding and higher vocational students' practical learning.

Internet embeddedness enables individuals to carry out practical learning more quickly and accurately under the condition of high AI literacy. Due to the fact that practical learning can open a window for higher vocational students to exchange knowledge and skills with the outside world (Yi, 2024), the acquisition of new skills and knowledge can explore new ideas or creativity for sustainable entrepreneurship, which is beneficial for entrepreneurs to carry out a new round of sustainable entrepreneurship practice. Therefore, there is a clear correlation between the entrepreneurs' AI literacy of and practical learning, and the knowledge and skills acquired in practical learning can affect entrepreneurs' exploration and identification of entrepreneurial opportunities, thereby indirectly influencing the formation of their sustainable entrepreneurial intentions.

On further analysis, AI literacy moderated the relationship between internet embedding and practical learning, as well as the relationship between internet embedding and sustainable entrepreneurial intentions, and the present study hypothesized that the mediating role of practical learning between internet embedding and higher vocational students' sustainable entrepreneurial intentions was also moderated by AI literacy. Hence the hypothesis:

H4: AI literacy moderates the indirect effect of internet embedding on higher vocational students' sustainable entrepreneurial intentions, i.e., the higher the level of AI literacy, the higher the indirect effect of internet embedding on higher vocational students' sustainable entrepreneurial intentions through practical learning.

Research Methodology

Research framework

The research framework was constructed according to the objectives (Figure 1).

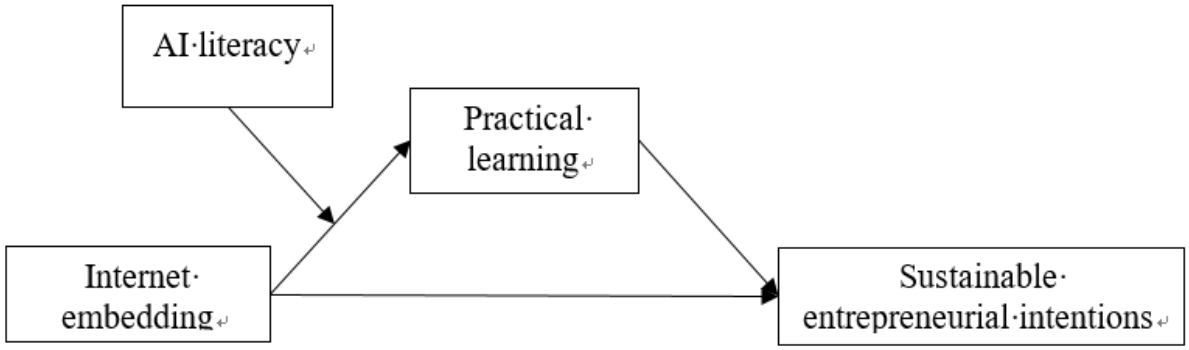

Figure 1: Research Framework

Sample and procedure

The interviewees are all Higher Vocational Students within Qinghai Province, China, recruited through purposive sampling with the assistance of college teachers. The survey was conducted in December 2024, using a purposive sampling method and online questionnaires to higher vocational students from 5 vocational schools in Qinghai Province, China, to assess their perceptions of internet embedding, sustainable entrepreneurial intentions, practical learning, AI literacy, and sustainable entrepreneurial intentions, which resulted in a final sample of 1,058 samples (validity rate of 88.16%), they all had experience of participating in entrepreneurial competition projects.

Measures

Internet embedding scale: Designed by Liu et al. (2016), divided into connectedness, sense of sacrifice, and match 3 factors, 15 items (The α of the scale = 0.688) and adopts a 5-point scale (1 = strongly disagree; 5 = strongly agree).

Sustainable entrepreneurial intentions scale: Designed by Agu et al. (2021), 4 items (The α of the scale = 0.966) and adopts a 5-point scale (1 = strongly disagree; 5 = strongly agree).

Practical learning scale: Designed by Jia et al. (2023), 4 items (The α of the scale = 0.867) and adopts a 5-point scale (1 = strongly disagree; 5 = strongly agree).

AI literacy scale: Designed by Zhou et al. (2024), divided into knowledge of AI (The α of the scale = 0.775), skills (α=0.911), attitudes and values (α=0.850), and ethics (α=0.865), 4 factors with 25 items and adopts a 5-point scale (1 = strongly disagree; 5 = strongly agree).

Gender, experience in environmental activities, highest degree planning, and nature of school were used as demographic background, and other variables were self-assessed on a 5-point scale.

Research Findings

Distribution of population characteristics

As shown in Table 1, the sample was predominantly female (651, 61.53%); students with experience in environmental activities were predominant (875, 82.70%); the highest degree plan was the bachelor's degree (965, 91.21%); and there were slightly more students from public schools (573, 54.16%).

Table 1: Distribution of Population Characteristics

Background variables	Category	N	%
Gender	Male	407	38.47%
	Female	651	61.53%
Experience in environmental activities	Have	875	82.70%
	No	183	17.30%
Highest degree planning	Bachelor	965	91.21%
	Master	89	8.41%
	Doctor	4	0.38%
Nature of school	Public school	573	54.16%
	Private school	485	45.84%

Note: n=1058.

Model fit

As shown in Table 2, the model has an SRMR=0.05, a good match.

Table 2: Root Mean Square Error

	O	M	95%	99%
Models of saturation	0.05	0.031	0.032	0.036
Estimated model	0.05	0.031	0.032	0.036

Note: n=1058.

Correlation analysis

As shown in Table 3, the correlation matrix shows that the internet embedding was significantly correlated with higher vocational students' sustainable entrepreneurial intentions (r=0.192*** p<0.05), and H1 hold.

Table 3: Correlation Analysis

Variant	Mean	SD	1	2	3	4
1) Internet embedding	3.687	0.985	(0.758)			
2) Practical learning	3.739	0.981	0.435***	(0.806)		
3) AI literacy	3.722	0.792	0.324***	0.358***	(0.799)	
4) Sustainable entrepreneurial intentions	3.892	0.916	0.192***	0.256***	0.165**	(0.794)
α			0.953	0.961	0.921	0.896
CR			0.685	0.761	0.96	0.743
AVE			0.576	0.651	0.639	0.632

Note: ***$P < 0.001$.

Table 4: Mediating and Moderating Effect Analysis

Effect	Path	Coefficients
Mediating	Internet embedding → practical learning→higher vocational students' sustainable entrepreneurial intentions	3.175*** (Sobel Z)
Moderating	Internet embedding × AI literacy → practical learning	0.156***

Note: ***$P < 0.001$.

Table 5 Mediating and Moderating Effect Analysis

	Sobel test		95 IC	
	Indirect effect	SE	Boot upper limit	Boot lower limit
AI literacy(low)	0.1231	0.0326	0.1267	0.2951
AI literacy(medium)	0.1435	0.0380	0.1634	0.3478
AI literacy(high)	0.1581	0.0523	0.1793	0.4234

Note: ***$P < 0.001$.

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Mediating and moderating effect analysis

Mediating effect test: This study uses path analysis to verify the mediating effect of practical learning. Moderating effect test: First, the AI literacy is centralized and interactive items are constructed (internet embedding × AI literacy); Secondly, with practical learning as the dependent variable, the moderating effect is tested by examining internet embeddedness and interaction terms. As shown in Table 4, the practical learning had a mediating effect (3.175***, $p<0.05$) on the path of internet embedding to higher vocational students' sustainable entrepreneurial intentions, and H2 hold (internet embedding → practical learning → sustainable entrepreneurial intentions); AI literacy has a significant positive moderating effect in the pathway internet embedding to the practical learning (0.156***, $p<0.05$), and H3 hold (internet embedding × AI literacy → practical learning).

Moderated mediation effect analysis

This study used bootstrap as a validation tool for the process plugin, as shown in Table 5, the indirect effect of internet embedding through practical learning on sustainable entrepreneurial intentions of higher vocational students is significant (0.1231***, 0.1435***, 0.1581***, $p<0.05$) at different levels of AI literacy, and H4 hold.

Discussions and Conclusion

Based on self-determination and social network theory, this study constructs a model of the facilitating effect of internet embedding on the sustainable entrepreneurial intention of higher vocational students, and draws the following conclusions with empirical research:

The results confirm for the first time that internet embedding is positively related to the sustainable entrepreneurial intention of higher vocational students in Qinghai Province, China. First, internet embedding can play the roles of information updating and market orientation, which can timely transmit information such as the latest developments of sustainable industries and changes in market demand to higher vocational students, help them construct cognitive frameworks, and inspire them to explore opportunities and then generate sustainable entrepreneurial intentions. Secondly, internet embedding can help higher vocational students learn from exemplary role models. Detailed sustainable entrepreneurship cases and tutorials on the internet provide inexperienced higher vocational students with rich learning materials, helping them to imitate sustainable entrepreneurship by referring to successful models. Thirdly, internet embedding can break the information asymmetry barrier for higher vocational students. The wide dissemination of internet communities and media has dissolved the information barriers of education, geography, and capital. Higher vocational students can contact competitors and successful models in the same industry that are not easily accessible in reality, which not only provides valuable practical references for higher vocational students, but also builds their network of contacts and develops potential sustainable entrepreneurship co-operation opportunities. In addition, in the process of sustainable entrepreneurship, entrepreneurs can enhance their ability to access resources through social networks, provide them with more critical information, and increase their confidence in responding to unexpected situations. This enables internet embeddedness to effectively enhance the higher vocational students' sustainable entrepreneurial intentions, promote future entrepreneurs to better adapt to changes in the external environment, and thus improve their participation in the formation of sustainable entrepreneurial actions in the future. On the other hand, internet embeddedness can also provide more entrepreneurial objects for sustainable entrepreneurs to refer to, help them

quickly transform information and increase their knowledge reserves in the process of communication and interaction with other subjects, which further establishes the higher vocational students' sustainable entrepreneurship belief, promotes the practice of future entrepreneurs participating in sustainable entrepreneurial activities, and has important value for improving the future sustainable economic development of Qinghai Province, China, and reversing the backward enterprise economic model.

On the other hand, in Qinghai Province, China, practical learning has a mediating effect on the relationship between internet embedding and higher vocational students' sustainable entrepreneurial intentions. Internet embedding can influence higher vocational students' knowledge exchange and sharing, promote them to make full contact with external information, broaden their relationship networks, accelerate their access to sustainable entrepreneurship knowledge, and enable them to have richer, faster, and more practical learning materials and information in the process of entrepreneurial learning, which in itself is a kind of access to sustainable entrepreneurship knowledge resources, and through practical learning strengthens higher vocational students' access to various resources.

In addition, AI literacy can moderate the relationship between internet embedding and practical learning in Qinghai Province, China. AI literacy of higher vocational students can better assist their learning by connecting with the outside world through the internet, and can also help them screen intended customers and cultivate their core competitiveness to gain a foothold in the sustainable market in the future. For example, PlasticRoad's recycled plastic road utilizes AI visual sorting and modular road design, consuming 25 tons of waste plastic per kilometer of road and extending its lifespan by three times. And Lumary solar intelligent irrigation, solar energy + supercapacitor + AI weather linkage, water saving by 30%, zero grid dependence, reducing battery waste by 95%, has served 50000 households in North America. Therefore, future entrepreneurs can use AI+Internet to transform environmental responsibility from a cost center to a value creation center, and upgrade community contributions to sustainable ecology. For example, Huawei Cloud Industry AI in China has provided energy consumption forecasting, carbon emissions, and capacity optimization for more than 2000 manufacturing enterprises, reducing carbon emissions by an average of 8-15%. The saved electricity costs are directly included in profits, achieving a dual effect of reducing carbon emissions and costs. Therefore, higher vocational students need to make full use of the power of Internet embedding, and actively acquire and apply AI knowledge and skills, and applications, to promote future learning activities.

The results further confirmed that AI literacy moderates the relationship between internet embedding and sustainable entrepreneurial intentions of higher vocational students in Qinghai Province, China. The deep embedding of the internet has led to the widespread adoption of AI (Kumar & Sangwan, 2024; Walter, 2024), making AI literacy the foundation of creativity (Gee & Zhang, 2024; Southworth et al., 2023), which not only enhances the speed of entrepreneurial learning, but also enhances the analysis of complex information and its utilization of complex information (Song et al., 2024), as well as activating awareness of sustainable entrepreneurial practices amongst higher vocational students in the future. Therefore, AI literacy should not only include computer operations and applications, but also the understanding, evaluation, and application of generative AI. Therefore, it is important for higher vocational schools in Qinghai Province, China, to build a comprehensive AI literacy education program, conduct practical learning activities, and promote the healthy development of the process, which in turn accelerates the process of intelligence and promotes sustainable entrepreneurship to a higher level.

Theoretical Contributions

There are three main research contributions:

First, this study fills the gap by demonstrating the above relationship for the first time with an empirical study on higher vocational students from 5 schools in Qinghai Province, China. This brings experience for the government of Qinghai Province, China, and higher vocational schools to better understand why individuals' connection to the outside world can drive the formation of sustainable entrepreneurial intentions among higher vocational students. As Li (2024) suggests, exploring the predictors that drive students' sustainable entrepreneurial intentions and arguing the main factors that influence it can provide an important basis for constructing relevant learning programs.

Secondly, this study emphasizes the attempt to understand the mediating and facilitating mechanisms of practical learning and AI literacy between internet embedding and sustainable entrepreneurial intentions in the context of Qinghai Province, China, and combines them with self-determination theory and social network theory to construct a research framework, which can help higher vocational students to practice sustainable entrepreneurial activities in the future. As Agu et al. (2021) suggest, only by identifying the main factors and mechanisms affecting sustainable entrepreneurial intentions can we fully stimulate the propensity of higher vocational students to engage in sustainable entrepreneurship in the future.

Third, the results of this study can not only enrich the related literature but also promote the in-depth development of self-determination theory and social network theory. As Lediana et al. (2023) suggest, only by utilizing different theories with systematic research can the theory of sustainable entrepreneurial intentions be better promoted.

Managerial Implications

Based on the results, the following revelations are proposed:

First, based on further improving the coverage of internet hardware conditions, more attention should be paid to the construction of internet content. Especially in the current context of complicated internet information, government departments and higher vocational schools in Qinghai Province, China, should join hands with various social forces to work together to improve the AI literacy of higher vocational students and strengthen the supervision of internet content, to make the internet serve the sustainable entrepreneurship of students more effectively.

Second, strengthen and guide the practical learning of students. It is recommended that higher vocational schools build a new type of practical learning model with the power of AI technology to cultivate their knowledge and skills, practical activities, etc. in the field of sustainable entrepreneurship.

Thirdly, the government of Qinghai Province in China should host a workshop on sustainable entrepreneurship to disseminate cutting-edge theories and practical cases and can invite successful entrepreneurs to share their practical experiences and play the role of role models, aiming to build a cooperative network of sustainable entrepreneurship, promote resource complementation and sharing, and further improve the policy of sustainable entrepreneurship.

Fourthly, enhance the higher vocational students’ sustainable entrepreneurial intentions in rural areas of Qinghai Province, China. In addition to strengthening government departments

and vocational schools to improve the entrepreneurial knowledge and skills of higher vocational students and cultivate their AI literacy, practical learning can also be carried out for students in rural areas to boost their entrepreneurial confidence and strengthen their sustainable entrepreneurial practices in rural areas in the future.

Limitations and Future Research Directions

This study has the following shortcomings: First, the sample collection is only in Qinghai Province, China, although the research process has taken into account the different schools as much as possible, but due to the limitation of the real conditions, the scope of the study is relatively small, and the follow-up study can appropriately expand the scope of the data collection. Second, sustainable entrepreneurial intentions of higher vocational students may be affected by other factors, such as: Resilient leadership, teacher dialectical feedback, human-AI collaborative, computational thinking efficacy, etc., and subsequent research can explore more antecedents and process mechanisms.

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