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Developing a Causal Model of Self-Directed Learning Based on Emotional Creativity with the Mediating Role of Knowledge Sharing and Information Literacy

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ABSTRACT

The present study aimed to determine the goodness of fit of a causal model of self-directed learning based on emotional creativity with the mediating role of knowledge sharing and information literacy among graduate students. This descriptive correlational study was conducted on 215 graduate students enrolled at the University of Ilam during the 2022–2023 academic year, who were selected through random sampling. Data collection was carried out using the Fisher et al. Standard Self-Directed Learning Questionnaire, the Averill et al. Emotional Creativity Questionnaire, the Katz and Macklin Information and Communication Technology Literacy Questionnaire, and the Van den Hooff and Van Weenen Knowledge Sharing Questionnaire. Data analysis was performed using structural equation modeling (SEM) with Smart PLS software. The results indicated a positive and significant relationship between emotional creativity and information literacy. Additionally, a relationship was found between emotional creativity and knowledge-sharing behavior. Furthermore, there was a significant causal relationship between emotional creativity and self-directed learning, as well as between information literacy and self-directed learning. Based on the SEM results, the fit indices, including R^2, GOF, and Q^2, were satisfactory. Therefore, it can be concluded that the conceptual model of self-directed learning based on emotional creativity, with the mediating role of knowledge sharing and information literacy, aligns well with the empirical model.

Keywords: *Self-Directed Learning, Emotional Creativity, Knowledge Sharing, Information Literacy, Graduate Education.*

1. Introduction

Today, there is an emphasis on the educational system's outcomes fostering critical thinking abilities, self-directed learning skills, and logical behavior when faced with the complexities of life (Shokrpour et al., 2024). The knowledge era, or the information age, which emerged as

humanity transitioned from the industrial age to the third millennium, demands an educational approach distinct from that of the past (Hosseini Tabaghdehi & Salehi, 2018). In this context, one of the most critical features in learning environments is readiness for self-directed and independent learning. Self-directed learning is inherently a way of life. Individuals from various walks of life, age groups, and occupations engage in self-directed learning activities outside formal classroom education and training centers (Robinson & Persky, 2020). Knowles (2011) argued that self-directed learners can identify their learning needs, set specific learning goals, locate the necessary resources, employ appropriate learning strategies, and ultimately evaluate their outcomes. According to educational experts such as Candy (1991), Garrison (1997), and Gibbons (2002), self-directed learning comprises three main components: self-control, self-management, and motivation for learning (Farokh & Shah Talebi, 2018; Hosseini Tabaghdehi & Salehi, 2018).

One factor associated with self-directed learning that enhances learners' self-confidence, capacity for independent learning in challenging educational settings, and their intrinsic motivation for learning is emotional creativity. Creativity is often seen as a manifestation of free expression, ranking among the highest levels of cognitive processes. In contrast, emotions often reflect internal arousals that can limit individuals' responses (Ma'aser & Zeraati, 2019). Averill (2009) defined emotional creativity as the self-expression of readiness in a novel way that expands individuals' thought patterns and enhances their interpersonal relationships. He posited that individuals with emotional creativity can accurately evaluate situations and skillfully articulate their emotions. Moreover, Averill emphasized that such individuals spend more time recognizing emotions and pay closer attention to their own and others' emotions. This characteristic, termed "readiness," aligns with acquiring information and knowledge in cognitive creativity models (Kuška et al., 2020).

Emotional creativity has been defined as self-expression in a new way that expands thought patterns and enhances interpersonal relationships. According to this definition, novelty, effectiveness, and authenticity are the three main elements of emotional creativity. Novelty refers to the ability to change typical emotions and create new emotional states that either deviate from norms and standards or represent a new combination of an individual's usual emotions. Effectiveness relates to the alignment of creative responses with social and cultural contexts, facilitating favorable relationships with others and improving individual cognitive styles. According to Averill (1999), when these changes lack effectiveness, neurotic behaviors such as alexithymia may arise (Averill, 2009). Authenticity in expressing emotions implies that emotions should stem from an individual's beliefs and convictions. When individuals express emotions inconsistent with their beliefs and feelings, they fail to meet the authenticity criterion, thereby disqualifying them as emotionally creative (Trnka, 2023).

Explaining self-directed learning solely through characteristics like emotional creativity is insufficient; learners must master all necessary skills for contemporary learning. One significant advancement in education is information and communication technology (ICT) literacy. Information literacy encompasses a continuum of abilities, activities, and mental habits that enhance deep learning, prepare individuals for self-directed learning, and facilitate interaction with online environments (Ma'aser & Zeraati, 2019). In the ICT era, students capable of effectively utilizing learning opportunities and managing their learning independently are those who have achieved acceptable levels of information literacy (Kankam, 2023; Shariati et al., 2024). Such students can navigate the challenges of virtual environments, critically analyze and accept information, become lifelong learners, and acquire the necessary knowledge to evaluate information pertinent to their needs (Ladell-Thomas, 2012). ICT literacy empowers individuals to establish, sustain, and deepen interactions with others to access, evaluate, and utilize information accurately, effectively, and creatively to meet their needs and those of others. In another view, ICT literacy can be defined as the ability to think critically about information and retrieve and utilize it effectively in reciprocal or multi-directional interactions with others (Faghih Aram & Ebrahimi, 2017).

Regarding the dimensions of ICT literacy, various studies have been conducted. Katz and Macklin (2007) suggested that ICT literacy assessment spans seven functional domains: identifying the need for information, accessing information via ICT, managing digital information, integrating collected information from diverse digital sources, evaluating online information, creating information, and establishing connections between them. They emphasized the importance of problem-solving and critical thinking in these domains. Based on existing definitions, ICT literacy encompasses a wide spectrum of skills ranging from basic technical abilities to complex critical thinking capabilities (Abili et al., 2017).

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Research also indicates that the primary barrier to effective knowledge management implementation is the lack of a culture of knowledge sharing and an understanding of its numerous benefits (Budur et al., 2024; Estherita, 2024). Knowledge sharing comprises behaviors that facilitate exchanging information and assisting others (Farokh & Shah Talebi, 2018). Knowledge sharing involves the transfer of knowledge between individuals—those who share knowledge and those who absorb it—and focuses on human capital and interpersonal interactions. Knowledge management at universities includes activities or processes such as creating, storing, sharing, and applying knowledge. Knowledge sharing is the most critical process in knowledge management, paving the way for new knowledge processes (Asfar & Zainuddin, 2015). Knowledge sharing helps individuals learn from one another, thereby contributing to organizational knowledge bases (Lee et al., 2018). Van den Hooff and Van Weenen (2004) described knowledge sharing as involving two critical components: knowledge donation and knowledge collection (Van den Hooff & Van Weenen, 2004).

Considering the aforementioned discussions and the rapid changes in social life, students need a dynamic model for continuously acquiring new knowledge and skills. The core of this dynamic model is self-directed learning. This study aims to enhance the quality and quantity of knowledge sharing within universities, expand this culture among faculty, students, and staff, and improve knowledge-sharing practices across society and other sectors. Furthermore, proper internet use by learners and a high level of information literacy increase student participation in learning, fostering greater motivation and more effective learning. Additionally, focusing on students' emotional creativity can significantly shape their personality and psychological capital, positively impacting their academic performance. This focus can mitigate academic underachievement and contribute to students' educational progress. Therefore, the current study seeks to answer whether the causal model of self-directed learning based on emotional creativity, with the mediating role of knowledge sharing and information literacy, aligns with the empirical model.

2. Methods and Materials

2.1. Study Design and Participants

This study is descriptive and correlational, investigating the relationship between predictor, criterion, and mediating variables. In terms of purpose, it is a developmental study, and in terms of execution, it is a correlational study utilizing structural equation modeling (SEM). The statistical population included all graduate students of Ilam University, with a total of 528 postgraduate students (480 master's students and 48 doctoral students) admitted during the 2022–2023 academic year. The sample size was determined using simple random sampling and Cochran's formula, calculating a sample size of 213.58 for master's students. To ensure against potential sample attrition, 215 participants were selected.

2.2. Measures

2.2.1. Self-Directed Learning

The Self-Directed Learning Questionnaire by Fisher et al. (2013) contains 41 items rated on a five-point Likert scale ranging from 1 (completely disagree) to 5 (completely agree). This instrument assesses the three components of self-directed learning: self-management (16 items), self-control (11 items), and motivation for learning (14 items). In Iranian students, the questionnaire extracts three factors: self-management, motivation for learning, and self-control, which together explain 27.16% of the total variance. Cronbach's alpha coefficients for the entire questionnaire and its subscales were reported as 0.87, 0.83, 0.82, and 0.66, respectively. Construct validity of the scale, assessed using factor analysis, has been reported as satisfactory. Nadi and Sajadian (2006) reported a reliability coefficient of 0.82 for the questionnaire, while Fisher et al. (2001) reported Cronbach's alpha values of 0.92 for the total scale and 0.85, 0.84, and 0.83 for the subscales of self-management, motivation for learning, and self-control, respectively (Abili et al., 2017).

2.2.2. Emotional Creativity

This questionnaire consists of 30 items designed to assess dimensions of emotional creativity, including emotional readiness, reactivity, effectiveness, and originality. Scoring is based on a five-point Likert scale, ranging from 1 (very low) to 5 (very high), with reverse scoring applied to items 11, 20, and 29. Ghadiri Nezhadian (2002) confirmed the construct validity of the emotional creativity scale through factor analysis. Gottbezahl and Averill (1996), in two studies involving psychology students, found that the questionnaire demonstrated high internal consistency (Ma'aser & Zeraati, 2019).

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2.2.3. *Information and Communication Technology Literacy*

The ICT Literacy Questionnaire, based on Katz and Macklin's (2007) theories, includes 63 items across seven domains: definition of needs (4 items), access (6 items), evaluation (4 items), management (7 items), synthesis (9 items), creation (17 items), and communication (16 items). Items are scored on a five-point Likert scale (1 = very low to 5 = very high). In a study by Abili et al. (2017), the reliability of this questionnaire was calculated using Cronbach's alpha at 0.8675. Content and face validity of the questionnaire were reviewed and approved by experts in the field of e-learning (Abili et al., 2017).

2.2.4. *Knowledge Sharing*

Developed by Van den Hooff and Van Weenen (2004), this questionnaire includes two components: knowledge donation and knowledge collection, comprising 10 items rated on a five-point Likert scale (1 = completely disagree to 5 = completely agree). Rajayi (2012) validated this questionnaire in a pilot study involving 30 participants, reporting a reliability coefficient of 0.86. Van den Hooff and Van Weenen (2004) reported Cronbach's alpha values of 0.78 and 0.85 for the knowledge collection and knowledge donation components, respectively. The questionnaire's validity was confirmed through factor analysis in Iranian studies (Bahrami & Jafari Herandi, 2020).

2.3. *Data Analysis*

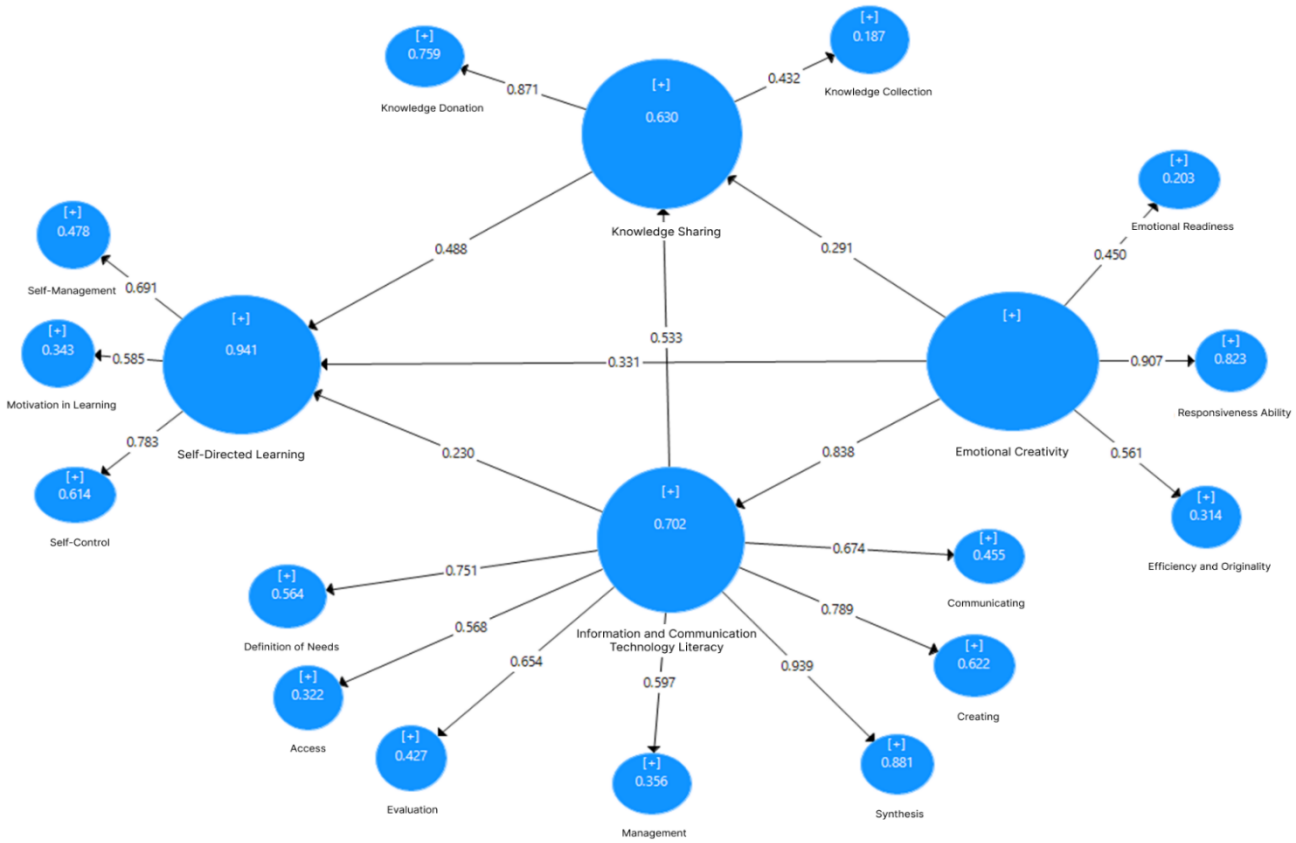
To identify the appropriate conceptual model, confirmatory factor analysis and structural equation modeling were conducted using Smart-PLS3 software. This analysis examined the relationships between the predictor, criterion, and mediating variables.

3. Findings and Results

In this study, structural equation modeling (SEM) was conducted using the Partial Least Squares (PLS) method to test the measurement model. The following diagrams illustrate the research model with standardized path coefficients.

Figure 1

Path Diagram with Standardized Coefficients



To assess the validity and reliability of the constructs in the measurement models using PLS, Cronbach's alpha, composite reliability (CR), convergent validity (AVE), and discriminant validity (Fornell-Larcker criterion) were calculated and reported. The Fornell-Larcker method indicated that the diagonal values in the matrix were greater than all values in the corresponding columns, confirming adequate discriminant validity. Cronbach's alpha values for all variables exceeded 0.7, indicating reliability. The average variance extracted (AVE) was consistently greater than 0.5, supporting convergent validity. Composite reliability (CR) values exceeded both AVE and 0.7, confirming the validity and reliability of the constructs. Additionally, the Rho reliability coefficient was above 0.7.

The structural model included multiple indices and criteria to ensure the results from the model and collected data were reliable. These indices included path coefficients (beta), their significance (t-values), the coefficient of determination (R^2) for endogenous latent variables, predictive relevance (Q^2), effect size (f^2), and goodness-of-fit (GOF).

Table 1

Overall Model Fit

Variable	R^2	Result	f^2	Result	GOF	Result	Q^2	Result
Knowledge Sharing			0.281					
Information Literacy	0.66	Strong	0.110	Strong	0.68	Very Strong	0.316	Strong
Emotional Creativity			0.216					

Table 1 demonstrates that the R^2 value for knowledge sharing, information literacy, and emotional creativity collectively predicts 0.68 of self-directed learning as an endogenous variable. The f^2 index, which represents the contribution of each predictor variable to R^2, is evaluated at thresholds of 0.02 (weak), 0.15 (moderate), and 0.35 (strong). The findings indicate that certain predictors contributed more significantly to R^2. The GOF index was determined to be strong, while the Stone-Geisser Q^2 value for self-directed learning was 0.316, indicating a strong structural model quality for the primary hypothesis. Overall, indices such as R^2, GOF, and Q^2 were at strong, very strong, and strong levels, respectively, indicating that the conceptual model of self-directed learning based on emotional creativity, with the mediating roles of knowledge sharing and information literacy, aligns well with the empirical model.

Table 2

Significance of Relationships Between Variables

Relationships	β	T-Value	Significance Level	Result
Emotional Creativity → Information Literacy	0.838	34.37	0.000	Confirmed
Emotional Creativity → Knowledge Sharing Behavior	0.291	2.973	0.000	Confirmed
Emotional Creativity → Self-Directed Learning	0.331	11.376	0.000	Confirmed
Information Literacy → Self-Directed Learning	0.230	5.029	0.000	Confirmed
Knowledge Sharing Behavior → Self-Directed Learning	0.448	10.397	0.000	Confirmed
Information Literacy → Knowledge Sharing Behavior	0.380	6.431	0.000	Confirmed
Emotional Creativity → Information Literacy → Self-Directed Learning	0.418	28.63	0.000	Confirmed
Emotional Creativity → Knowledge Sharing Behavior → Self-Directed Learning	0.521	31.48	0.000	Confirmed

As shown in Table 2, the calculated t-values for the relationships between independent and dependent variables exceeded 1.96, indicating significance at the 95% confidence level. The path coefficients for the relationships between emotional creativity and information literacy, knowledge sharing, and self-directed learning were 0.83, 0.29, and 0.33, respectively, all significant at the 0.05 level. Similarly, the relationships between information literacy, knowledge sharing, and self-directed learning showed path coefficients of 0.23 and 0.44, respectively, significant at the 0.05 level. The relationship between knowledge sharing behavior and self-directed learning had a path coefficient of 0.44, while the relationship between knowledge sharing behavior and information literacy had a path coefficient of 0.38, both significant at the 0.05 level.

4. Discussion and Conclusion

Based on the results of the conceptual model, self-directed learning based on emotional creativity, with the mediating role of knowledge sharing and information literacy, among postgraduate students of Ilam University during the 2022–2023 academic year, demonstrates a satisfactory fit. The findings reveal a statistically significant causal relationship between emotional creativity and information literacy. This result aligns with the prior findings (Faghih Aram & Ebrahimi, 2017; Farokh & Shah Talebi, 2018).

These findings suggest that identifying factors influencing students' academic creativity enhances university administrators' capacity to design effective programs that foster creativity. Additionally, understanding these factors allows for the development of strategies to eliminate barriers to creativity, paving the way for student success and preventing the waste of time, national resources, and human capital. Furthermore, university managers and students across all disciplines must possess information literacy tailored to current and future needs, which requires innovation, creativity, and the expansion of thought and cognition. Utilizing information literacy within universities increases student activity and shifts the role of professors from mere transmitters of information to facilitators of learning. Increased student activity enhances effective teaching and learning, fostering creativity, entrepreneurship, emotional readiness, responsiveness, efficiency, and originality among students.

The causal relationship between emotional creativity and knowledge-sharing behavior was also statistically significant. This finding is consistent with the previous studies (Moomivand et al., 2021; Shahlaei, 2015). Knowledge sharing is one of the most critical actions for effective knowledge management in organizations. It reduces organizational costs; neglecting it can increase costs due to repeated mistakes. Alongside other factors, the role of human resources as both creators and users of knowledge is increasingly significant. Organizations strive to enhance performance and achieve sustainable competitive advantages through knowledge sharing. By combining knowledge and experience with others' knowledge, new knowledge—essential for innovation—is generated. Identifying factors that enhance creativity and innovation is critical for organizations, especially educational institutions. Knowledge sharing and creativity are interdependent, with knowledge sharing enabling creativity.

The causal relationship between emotional creativity and self-directed learning was statistically significant but weak. When mediating variables (information literacy and knowledge-sharing behavior) were introduced, emotional creativity indirectly predicted self-directed learning. This finding aligns with the prior studies (Lee et al., 2018; Ma'aser & Zeraati, 2019). Emotional creativity fosters confidence and the capacity for independent learning in challenging educational environments. It enables individuals to generate and express novel, effective, and authentic emotional responses, leading to creative emotional reactions.

A significant causal relationship was found between information literacy and self-directed learning. This result aligns with the prior findings (Abili et al., 2017; Hosseini Tabaghdehi & Salehi, 2018; Ladell-Thomas, 2012). Information literacy encompasses a range of abilities, activities, and mental habits that enhance deep learning, increase readiness for self-directed learning, and facilitate web-based interaction. Students with strong information literacy skills can effectively use multimedia tools, select appropriate learning strategies, evaluate learning outcomes, and enhance digital literacy skills.

The causal relationship between knowledge-sharing behavior and self-directed learning was also statistically significant. This finding is consistent with the prior studies (Amoli et al., 2021; Farokh & Shah Talebi, 2018; Hosseini Tabaghdehi & Salehi, 2018). Self-directed learning is a process where individuals identify learning needs, set learning goals, select appropriate strategies, and evaluate outcomes, independently or with others' assistance. Knowledge sharing plays a crucial role in facilitating this process, especially in an era where traditional learning approaches are shifting toward modern, self-directed strategies. Knowledge sharing focuses on human capital and interpersonal interactions, fostering both individual and group learning.

The causal relationship between knowledge sharing and information literacy was statistically significant, consistent with the prior findings (Bahrami & Jafari Herandi, 2020; Hosseini Tabaghdehi & Salehi, 2018). Higher education institutions play a critical role in knowledge creation, dissemination, and sharing, influencing public and private sectors' knowledge-sharing culture and structure. Enhancing knowledge-sharing practices within universities positively impacts societal and organizational levels. Universities, as reflections of a nation’s knowledge-based progress, rely on

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information literacy and effective knowledge management for sustainability and growth.

A significant causal relationship was also found between emotional creativity and self-directed learning, mediated by information literacy. This finding partially aligns with prior studies (Abili et al., 2017; Ma'aser & Zeraati, 2019). Emotional creativity fosters confidence, capacity for learning, and adaptability in challenging environments. However, self-directed learning also requires mastery of modern learning skills, particularly ICT literacy.

Finally, the relationship between emotional creativity and self-directed learning, mediated by knowledge-sharing behavior, was statistically significant. This finding aligns with prior studies (Farokh & Shah Talebi, 2018; Moomivand et al., 2021; Shahlaei, 2015). Emotionally creative individuals dedicate time to understanding emotions and using this understanding for adaptation, producing unique emotional responses. Knowledge sharing plays a vital role in fostering collaboration among emotionally creative individuals, leading to enhanced creativity and innovation.

Based on the findings, university administrators should revise their perspectives on the role of knowledge sharing among students and promote a culture of knowledge transfer. Strengthening inter-departmental collaborations through joint events and projects can foster knowledge sharing. Workshops to improve information literacy among students and faculty, along with access to diverse internal and external knowledge resources, are essential for enhancing research and education outcomes.

Authors' Contributions

Authors contributed equally to this article.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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Declaration of Interest

The authors report no conflict of interest.

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Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants.

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