ASEAN Journal of Educational Research and Technology

Journal homepage: https://ejournal.bumipublikasinusantara.id/index.php/ajert

Enhancing Occupational Identity and Self-Efficacy Through a Self-Education Model in Art and Design Education Aligned with SDGs

Xiaodan Yu, Jiraporn Chano[*]*, Montree Wongsaphan*

Mahasarakham University, Mahasarakham, Thailand
Correspondence: E-mail: jiraporn.j@msu.ac.th

ABSTRACT

This study aimed to enhance students' occupational identity and self-efficacy in art and design education through a theory-integrated self-education model. Using a mixed-methods approach grounded in Social Cognitive Theory, Vocational Identity Theory, and Career Self-Efficacy Theory, the model was developed and tested with first-year vocational students. The model's effectiveness was evaluated through pre- and post-intervention assessments and qualitative interviews. Results revealed improvements in identity awareness, career exploration, and self-efficacy dimensions, including problem-solving and career planning. These improvements occurred because the model integrated project-based learning, industry exposure, and structured reflection, enabling students to link learning with future careers. This has implications for achieving Sustainable Development Goals (quality education) by promoting inclusive, relevant, and future-oriented learning frameworks for creative vocational education. The model provides educators and policymakers with a replicable structure for supporting professional growth in rapidly evolving industries.

ARTICLE INFO

Article History:
Submitted/Received 25 Mar 2025
First Revised 25 Apr 2025
Accepted 30 Jul 2025
First Available online 31 Jul 2025
Publication Date 01 Mar 2026

Keyword:
Art and design,
Occupational identity,
Self-education,
Self-efficacy,
Vocational education.

1. INTRODUCTION

The global expansion of the creative economy has elevated the urgency of preparing vocational students for careers in art and design. According to the United Nations Conference on Trade and Development, creative industries now account for a growing share of global GDP and offer high potential for employment, especially in emerging economies. That is the main reason for many reports being well-developed (see **Table 1**). In China, vocational education is central to this agenda. However, many students in art and design programs at vocational colleges struggle with unclear professional identity and limited confidence in their capabilities. These challenges pose a risk not only to student retention and career success but also to the effectiveness of national development strategies, including those aligned with Sustainable Development Goals (SDGs), which promote inclusive and equitable quality education and lifelong learning opportunities.

Table 1. Previous studies on vocational education.

No.	Title	Reference
1	Sustainable global economy through technical and vocational education and training for skilled workforce in achieving good governance	Olabiyi (2025)
2	Portfolio-based assessment in research methodology course students in vocational education	Nurhayati *et al*. (2024)
3	Measurement of the level of digital competence of vocational teachers in learning development	Massadah & Widaningsih (2024)
4	A bibliometric analysis of vocational school keywords using VOSviewer	Al Husaeni & Nandiyanto (2023)
5	Current issue in the technical vocational education and training (TVET) instructor	Minghat *et al*. (2023)
6	The relationship of vocational education skills in agribusiness processing agricultural products in achieving sustainable development goals (SDGs)	Gemil *et al*. (2024)
7	Interactive multimedia design of motion graphics using a project-based learning approach for vocational education students: Experiments in cooking...	Nurani *et al*. (2024)
8	Understanding vocational students' perception of video animation "physical activity and dietary behavior"	Muktiarni *et al*. (2024)
9	How to make a cognitive assessment instrument in the merdeka curriculum for vocational high school students: A case study of generating device...	Fiandini *et al*. (2024)
10	Industrial engineering students' readiness towards industrial revolution 4.0 at technical and vocational university: Literature review	Anwar & Minghat (2024)
11	Adaptive strategies for technical and vocational education and training (TVET) science educators: Navigating online home-based learning	Hashim *et al*. (2024)
12	Bibliometric analysis on artificial intelligence research in Indonesia vocational education	Rahmiyanti (2024)

Research consistently indicates that low occupational identity and self-efficacy among vocational students hinder their learning engagement, resilience, and decision-making capacity (Chang *et al*., 2025; Liao *et al*., 2024; Wang *et* al., 2023). These issues are particularly pronounced in creative disciplines, where rapid technological change, informal employment structures, and project-based workflows create unique pressures. Students often enter the field with idealistic expectations of creative freedom, only to confront the realities of client-driven revisions, competitive labor markets, and uncertain career trajectories (Zhang & Li, 2023; Li & Wang, 2023). This mismatch between educational preparation and industry realities results in diffused identity and low self-confidence, especially in areas requiring interpersonal negotiation, technological adaptation, and portfolio development (Bridgstock, 2011; Fleischmann, 2015).

Occupational identity refers to the extent to which individuals internalize a vocation's values, norms, and future roles, while occupational self-efficacy concerns individuals' belief in their ability to perform career-related tasks effectively (Betz, 2000). These two constructs are mutually reinforcing: a stronger sense of self-efficacy promotes persistence in skill development, and a clearer identity enhances motivation and direction. Within the creative sector, however, students often report confidence in abstract ideation but lower self-belief in technical execution, industry communication, and client collaboration (Benham, 2008; Richards *et al*., 2020). These disparities illustrate the need for structured educational models that not only deliver skills but also build professional identity and self-confidence in tandem.

Despite the recognition of these issues, there remains a lack of empirically validated pedagogical frameworks that integrate key theories of career development within creative vocational contexts. Most interventions focus narrowly on skills acquisition or policy-level reforms, without operationalizing a holistic approach to self-development. The majority of China's vocational education literature consists of policy analysis or conceptual discussions, with few studies adopting R&D designs that include field testing, feedback cycles, and mixed-methods evaluation (Zhu and Tang, 2025). Moreover, while SDL models have gained popularity globally (Panadero, 2017), these models often originate from university or corporate settings and are rarely adapted to the specific needs of vocational students in art and design disciplines. The lack of theory-driven, field-tested models hinders educators and curriculum developers from advancing pedagogies that are both academically sound and practically implementable.

National education reforms in China have begun to address these concerns. Documents (such as the Guidelines on Promoting the High-Quality Development of Modern Vocational Education in the State Council of the People's Republic of China in 2021 and the revised Vocational Education Law in the National People's Congress in 2022) call for stronger collaboration between schools and enterprises and emphasize student-centered learning. These reforms are aligned with SDG 4 targets related to skill acquisition, employability, and relevant learning outcomes. However, without grounded instructional models that reflect the realities of the creative sector, these policies risk remaining aspirational rather than transformative.

This study responds to the identified gaps by developing, validating, and empirically testing a theory-integrated Self-Education Model (SEM) tailored for art and design students in Chinese vocational colleges. The model incorporates principles from Social Cognitive Theory (SCT), Vocational Identity Theory (VIT), and Career Self-Efficacy Theory (CSET), aiming to address both the personal and contextual dimensions of career development. The SEM engages students in project-based learning, structured reflection, industry exposure, and

mentor feedback, strategies designed to enhance both identity formation and task-specific confidence. By embedding these components within a cohesive instructional cycle, the model provides a practical tool for educators seeking to foster meaningful career development in creative fields.

The novelty of this study lies in its integration of three established theoretical frameworks into a single, field-tested model of self-education that is sensitive to the cultural, institutional, and industrial dynamics of vocational art and design education. It contributes methodologically by employing a multi-phase R&D approach, including qualitative needs analysis, expert validation, and quasi-experimental evaluation. It contributes practically by aligning its outcomes with national reform goals and global education targets under SDG 4. Its impact extends beyond the immediate student population by offering a replicable, evidence-based model for enhancing the quality and relevance of vocational education in creative sectors facing rapid change and global competition.

2. LITERATURE REVIEW

The development of students' occupational identity and self-efficacy is widely recognized as a critical goal in vocational education, especially in creative disciplines (such as art and design). However, empirical evidence addressing these constructs within the context of Chinese higher vocational education remains limited. This literature review builds a conceptual foundation for the SEM introduced in this study by examining five key domains: (i) self-education in vocational and creative contexts, (ii) occupational identity, (iii) occupational self-efficacy, (iv) theoretical foundations of the model, and (v) the integrative logic behind the model's design.

2.1. Self-Education in Vocational and Creative Contexts

Self-education, often referred to as self-directed learning (SDL), is defined as a process where individuals take initiative in diagnosing learning needs, setting goals, identifying resources, selecting strategies, and evaluating outcomes. Meta-analytical research has affirmed that SDL positively correlates with academic achievement, motivation, and lifelong learning readiness across a range of educational levels and disciplines (Panadero, 2017). Despite its broad applicability, most empirical SDL research originates from traditional university settings, corporate training programs, or health sciences education, with limited focus on vocational or creative education contexts (Zhu & Tang, 2025).

Creative majors (such as art and design) exhibit distinctive educational and occupational characteristics that differentiate them from other vocational tracks. First, their curricula are primarily studio-based and emphasize iterative ideation, visual critique, and portfolio development (Lassig & Mahony, 2020). This pedagogical model prioritizes experimentation and subjectivity, making learning deeply contextual and personal. Second, employment in the creative sector relies heavily on demonstrable competencies and adaptability to new technologies. The accelerating pace of digital innovation demands continuous skill upgrading (Orlandi *et al*., 2024), while both technical and soft skills rapidly lose relevance in the evolving digital economy (Schislyaeva & Saychenko, 2022). Third, professional advancement often occurs through informal networks and curated portfolios rather than formal credentials, further amplifying the need for learner autonomy and initiative.

These conditions require SDL approaches that are responsive to the studio culture and employment realities of the creative industries. However, empirical studies focused on such adaptations remain rare. A recent scoping review of 57 international design education studies identified only six that included structured SDL components, and none of them were

grounded in theory or tested in China (Chang *et al*., 2025). In Chinese higher vocational colleges (Gaozhi), further complications arise from large class sizes, inconsistent access to industry mentors, and rigid syllabi that offer limited flexibility for student-led learning. While national policy has begun to promote school–enterprise partnerships and individualized learning pathways, implementation remains generic and often disconnected from the actual learning needs of art and design students.

A well-structured SEM, grounded in both theory and contextual realities, could bridge this gap. It could empower students to take ownership of their learning, develop the competencies demanded by the creative industry, and build confidence in navigating dynamic professional landscapes. Importantly, it would also align with the SDG 4 mandate of ensuring quality education that is relevant, inclusive, and future-oriented. Without such models, vocational programs risk producing graduates with technical abilities but insufficient professional clarity or resilience.

2.2. Occupational Identity in Vocational Education

Occupational identity (OI) is a psychological construct referring to the degree to which individuals internalize the norms, values, and roles associated with a particular occupation. A well-formed occupational identity provides individuals with direction, motivation, and a framework for interpreting their professional experiences. Longitudinal research has linked strong OI to persistence in education, proactive upskilling, and better adjustment during career transitions (Flum & Blustein, 2020). In the Chinese context, factors (such as family expectation, social prestige, and peer comparison) play additional roles in shaping OI, particularly within collectivistic cultures (Wang *et al*., 2023).

Among art and design students, the development of occupational identity is especially complex. The creative sector encompasses diverse career trajectories, many of which lack clearly defined roles or stable employment structures. Frequent shifts in technology, aesthetics, and consumer demands add further volatility. Research indicates that while many design students are initially driven by a passion for art, they often struggle to articulate how this passion translates into a viable profession. These difficulties manifest as diffused identity, career indecision, and reduced engagement with professional preparation. Employer surveys likewise identify an “uncertain professional self-concept” as a barrier to integrating graduates into the workforce (Bridgstock, 2011; Wilson & Zamberlan, 2015).

Efforts to foster occupational identity must address both cognitive understanding and emotional commitment. Reflective practices (such as journaling, critique sessions, and portfolio reviews) have shown promise in supporting identity development (Reid *et al*., 2008). Yet such practices are inconsistently implemented in Chinese vocational education, often due to limited instructional time and the absence of credit-bearing reflection modules. A structured model that embeds identity-building activities into regular instruction could help address this deficiency.

In terms of policy alignment, fostering occupational identity is directly relevant to SDG 4.4, which emphasizes increasing the number of youth with relevant skills for employment and entrepreneurship. Without a solid professional identity, vocational students may possess technical skills but lack the orientation and self-concept needed to thrive in complex and shifting labor markets. This disconnect reduces not only individual success but also systemic efficiency, as students may leave their fields or struggle to integrate into professional communities.

2.3. Occupational Self-Efficacy

Occupational self-efficacy (OSE) is defined as individuals' belief in their capacity to perform tasks required for career success (Betz, 2000). OSE is shaped by mastery experiences, vicarious learning, verbal persuasion, and emotional states. Numerous studies have demonstrated that OSE predicts critical career outcomes (such as job-search behavior, persistence, and early job performance) (Lent *et al*., 1994; Lent & Brown, 2013).

Within art and design education, OSE presents domain-specific variability. Students often express strong self-belief in creative ideation and expression but show low confidence in areas (such as client negotiation, feedback incorporation, and digital troubleshooting) (Benham, 2008; Richards *et al*., 2020). This uneven confidence profile reflects the multidimensional demands of creative work and suggests that generic approaches to self-efficacy enhancement may fall short. Tailored interventions that address both artistic and professional dimensions are therefore essential.

In China's vocational sector, studies in fields (such as nursing) have shown that OSE mediates the relationship between professional identity and learning engagement (Liao *et al*., 2024). Although direct evidence for this mediating role in art and design remains limited, the logic of interaction is theoretically sound: stronger self-efficacy encourages students to invest in challenging tasks, and this effort reinforces their occupational identity through successful experience. Conversely, students with low self-efficacy may avoid engagement, further weakening identity formation and skill acquisition.

Current vocational curricula often lack explicit structures to promote OSE development. While internships and competitions may offer opportunities for mastery experiences, their effectiveness depends on student preparation, guidance, and feedback, elements that are often inconsistent or absent. A SEM grounded in SCT could help address this gap by systematically embedding opportunities for success, modeling, and reflection into the learning process.

2.4. Three Complementary Theories

The SEM proposed in this study is theoretically anchored in three complementary frameworks: SCT, VIT, and CSET. These theories offer interconnected lenses through which identity and confidence can be cultivated in educational settings.

2.4.1. Social cognitive theory (SCT)

SCT posits that human functioning results from dynamic interactions between personal factors, behavior, and environment, a principle known as triadic reciprocity. SCT emphasizes the importance of mastery experiences, vicarious learning, verbal persuasion, and emotional regulation as sources of self-efficacy. For students in creative fields, mastery experiences (such as completing a client design brief) can build confidence. Similarly, observing successful peers or alumni through portfolio showcases or mentor talks provides vicarious learning that strengthens belief in one's capabilities (Klassen & Durksen, 2014).

However, access to such experiences varies significantly in Chinese vocational colleges. Constraints (such as limited studio time, inconsistent mentor availability, and standardized assessments) often prevent students from gaining meaningful mastery experiences (Wang & Chen, 2022). Embedding SCT-informed practices into a SEM can help compensate for these gaps by ensuring that students receive continuous, structured opportunities for self-regulated learning and reflective practice.

2.4.2. Vocational identity theory (VIT)

Vocational Identity Theory conceptualizes career development as a process involving exploration, commitment, and reconstruction. Identity formation is not static but evolves as individuals engage with new experiences and reflect upon their meaning. In educational contexts, reflective activities (such as journaling, identity statements, and visual storytelling) can facilitate this process (Reid *et al*., 2008). These tools are particularly useful in art and design education, where students must often narrate and justify their creative decisions.

However, reflective practices are often marginalized in Chinese vocational syllabi. Unlike Western institutions that incorporate credit-bearing modules for reflection and critique, Chinese programs tend to emphasize technical execution and product delivery (Bridgstock, 2011). The SEM addresses this limitation by explicitly integrating reflection as a pedagogical requirement, not an optional or peripheral activity. It includes activities like career-vision boards, post-project debriefings, and identity statements, all designed to support internalization of professional roles.

2.4.3. Career self-efficacy theory (CSET)

CSET builds upon SCT by applying its principles specifically to vocational and career domains. It posits that domain-specific self-efficacy strongly influences career choices, goal setting, persistence, and success (Betz, 2000). CSET also forms the backbone of the Social-Cognitive Career Theory (SCCT) (Lent *et al*., 1994), which integrates self-efficacy with outcome expectations and personal interests to predict behavior. This framework has been widely used to explain career-related motivation and decision-making.

In practice, CSET is often operationalized using tools (such as the Career Decision-Making Self-Efficacy Scale (CDMSE)), which measure confidence in abilities like career planning, information gathering, and goal selection. Although meta-analyses confirm the effectiveness of self-efficacy interventions across higher education settings (Bould *et al*., 2021), studies involving creative majors remain limited. Among the 42 studies in one meta-review, only three included participants from design-related fields, and none were conducted in China. This gap underscores the need for localized models that adapt CSET constructs to creative vocational education.

2.5. Integrative Logic of The Self-Education Model (SEM)

The conceptual strength of the SEM lies in its integration of SCT, VIT, and CSET into a coherent learning cycle tailored for art and design students. Drawing from SCT, the model includes mastery-oriented tasks (e.g., real-world projects), vicarious exposure (e.g., alumni panels), and self-regulatory prompts (e.g., learning contracts) to build students' occupational self-efficacy. From VIT, the model incorporates identity exploration tools (such as reflective critiques and narrative identity activities) to help students internalize their roles as creative professionals. CSET contributes the framework for scaffolding students' confidence in career-specific behaviors like goal selection, problem-solving, and information gathering.

Importantly, the model acknowledges that identity and self-efficacy are interconnected and mutually reinforcing. When students experience success in meaningful tasks, their belief in their competence increases. This self-efficacy, in turn, strengthens their vocational identity by validating their sense of belonging to a profession (Betz, 2000). Although the reciprocal

relationship is not tested as a formal hypothesis in this study, it underpins the rationale for simultaneous intervention across both constructs.

The model is also designed to address context-specific challenges in Chinese vocational education. These include large student-to-teacher ratios, limited exposure to industry practice, and insufficient emphasis on personal development. By embedding career-building components into regular coursework and aligning them with industry expectations, the model seeks to narrow the gap between academic preparation and employment readiness. Furthermore, the SEM supports national educational reform goals and directly contributes to the SDG 4.3 and 4.4 targets by enhancing access to quality, relevant, and inclusive vocational training.

The SEM is both theoretically grounded and contextually responsive. It advances the literature by combining three robust theoretical frameworks into a practical, testable intervention designed to build professional identity and confidence among creative vocational students. The next section outlines the research design and methodological approach used to develop, validate, and evaluate this model in the context of Environmental Art Design education.

3. METHODS

This study employed a multi-phase Research and Development (R&D) design to develop and validate a theory-driven SEM aimed at improving occupational identity and self-efficacy among first-year students in a Chinese vocational art and design program. The methodological approach integrated both qualitative and quantitative techniques across three consecutive phases: (i) contextual analysis and needs identification, (ii) model development and expert validation, and (iii) model implementation and empirical evaluation. This comprehensive design not only ensured theoretical rigor and contextual relevance but also allowed for iterative refinement of the model before final testing.

3.1. Research Design

The research design followed a one-group quasi-experimental pre-test/post-test model, complemented by thematic analysis of qualitative data. This approach is well-suited for testing instructional innovations in naturalistic educational settings, where random assignment is often not feasible. The design also aligns with current best practices in design-based research and educational model development.

Each of the three research phases was carefully aligned with specific theoretical, developmental, and evaluative objectives. In Phase 1, qualitative data were collected through interviews with experienced teachers and focus group discussions with students from diverse art and design majors. The goal was to identify key contextual challenges and requirements that a SEM would need to address. Phase 2 focused on synthesizing these insights with theoretical constructs from SCT, VIT, and CSET to build a prototype SEM, which was then reviewed by domain experts. Phase 3 involved the implementation of the model in a 16-week course, during which pre- and post-test data were collected to evaluate its impact on students' occupational identity and self-efficacy.

This three-stage design reflects a developmental logic that moves from exploration to construction to evaluation, providing a rigorous foundation for model generalization and replication in similar educational contexts.

3.2. Participant Information

3.2.1. Phase 1 participants: Need analysis

In the first phase, two participant groups were involved: teachers and students. A total of five experienced teachers from vocational colleges in Guangzhou were selected for semi-structured interviews. All had over five years of teaching experience in art and design education, ensuring that the insights gathered would reflect sustained pedagogical engagement and institutional familiarity.

Table 2 presents the demographic characteristics of the teacher participants, including age, gender, academic qualifications, and professional role. The group included both professors and lecturers, with backgrounds in design education and educational psychology.

Table 2. Demographic information of teacher participants.

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	4	40%
	Female	6	60%
Age	21–30 years	3	30%
	31–40 years	5	50%
	41–50 years	2	20%
Teaching Experience	< 5 years	2	20%
	5–10 years	4	40%
	> 10 years	4	40%
Teaching Subject	Art and Design	6	60%
	Vocational Training	4	40%

Following the teacher interviews, 25 students from 11 different art and design majors were selected to participate in focus group discussions. The majors included Visual Communication Design, Digital Media Art Design, Product Art Design, Environmental Art Design, Game Art Design, Animation Design, Personal Image Design, Leather Art Design, Interior Art Design, Craft Art Design, and Exhibition Art Design. The students were randomly assigned to five focus groups of five participants each, with disciplinary diversity ensured within each group. This structure facilitated the emergence of cross-disciplinary perspectives on occupational development challenges, self-directed learning, and career motivation.

The combination of teacher interviews and student focus groups allowed for triangulation of perspectives and helped identify critical gaps in current educational practices related to identity and efficacy development. These findings guided the content and structure of the subsequent model.

3.2.2. Phase 2 participants: Expert validation

In the second phase, five experts were purposively selected to validate the theoretical and instructional structure of the initial SEM prototype. The panel comprised specialists in art and design education, educational evaluation, instructional design, and career development. All experts held advanced academic degrees and had experience advising on curriculum design

and pedagogy for creative disciplines. Demographic information about the expert panel is shown in **Table 3**.

Each expert participated in a structured evaluation process involving Likert-scale ratings and open-ended feedback to assess the model's clarity, comprehensiveness, feasibility, and theoretical alignment. This feedback was used to revise and refine the model before implementation in Phase 3.

Table 3. Demographic information of expert panel members.

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	3	60%
	Female	2	40%
Educational Level	Doctoral Degree	5	100%
Institution Type	University	3	60%
	Vocational Institute	2	40%
Field of Expertise	Vocational Education	2	40%
	Art and Design	2	40%
	Curriculum Development	1	20%

3.2.3. Phase 3 participants: Model implementation

The third phase involved a quasi-experimental implementation of the SEM with 61 first-year undergraduate students majoring in Environmental Art Design at Guangzhou Panyu Polytechnic. These students were enrolled in the 2024–2025 academic year and participated in a 16-week intervention integrated into their regular coursework.

Participant selection followed purposive sampling, and the sample size was justified through a power analysis using G*Power version 3.1.9.7. With parameters set at $\alpha = 0.05$, a two-tailed test, a medium effect size (Cohen's $d = 0.5$), and a power level of 0.80, the analysis indicated that a minimum of 34 participants would be sufficient to detect meaningful changes. To enhance robustness and account for attrition, 61 students were included.

Table 4 summarizes the participants' gender distribution, academic level, and program of study. All participants completed both the pre-test and post-test questionnaires, with anonymized coding used to match responses across time points. Four incomplete responses were excluded from the final analysis, yielding a valid sample size of 57 students. This sample was deemed sufficient to perform parametric statistical tests based on the Central Limit Theorem, which allows for the use of such tests in samples exceeding 30 cases.

Table 4. Basic Information of the participants for pre/post post-test.

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	27	45
	Female	33	55
Age	18–20 years	40	66.7
	21–23 years	20	33.3
Grade Level	Second Year	35	58.3
	Third Year	25	41.7
Department	Art and Design	60	100

3.3. Research Instrument

To measure the impact of the SEM on students' occupational identity and self-efficacy, two validated instruments were adapted from the literature. These instruments were originally developed for nursing students in Chinese vocational colleges and have demonstrated strong psychometric properties. For the present study, items were reviewed by three domain experts to ensure relevance and clarity for art and design students, with minor wording adjustments to reflect discipline-specific terminology.

The Occupational Identity Questionnaire consists of 17 items divided into three dimensions:

(i) Occupational self-awareness (6 items)
(ii) Autonomy and persistence in career choice (6 items)
(iii) Occupational exploration behaviors (5 items)

The Occupational Self-Efficacy Questionnaire comprises 27 items distributed across five dimensions:

(i) Self-evaluation ability (7 items)
(ii) Ability to obtain occupational information (5 items)
(iii) Goal selection ability (5 items)
(iv) Career planning ability (5 items)
(v) Problem-solving ability (5 items)

All items were rated on a 5-point Likert scale, from 1 ("strongly disagree") to 5 ("strongly agree"). Reliability analysis using Cronbach's alpha yielded high internal consistency: $\alpha = 0.870$ for occupational identity and $\alpha = 0.850$ for occupational self-efficacy. These values indicate excellent internal reliability and support the validity of using the adapted instruments with the target population.

Further psychometric indicators from the original validation study included split-half reliability (0.840 for occupational identity; 0.780 for occupational self-efficacy) and acceptable model fit indices from Confirmatory Factor Analysis (e.g., RMSEA < 0.06, CFI > 0.90), strengthening confidence in the scale structure.

3.4. Model Implementation Procedure

The SEM was implemented over a 16-week semester during the second half of 2024. The intervention was embedded within a core course in the Environmental Art Design program and was organized into three structured phases, each with defined objectives and activities:

(i) Pre-stage (Weeks 1-2): Students completed baseline assessments and participated in goal-setting workshops. The aim was to increase self-awareness and prepare students for self-directed engagement.
(ii) While-stage (Weeks 3-14): The core learning phase involved project-based assignments, industry interactions (e.g., company visits, guest lectures), and regular mentor feedback through digital portfolios. These activities aimed to build self-efficacy and foster occupational identity through mastery experiences and reflection.
(iii) Post-stage (Weeks 15-16): The final phase featured public exhibitions of student projects, learning report presentations, and post-test questionnaire administration. Reflection was emphasized to consolidate gains and promote future goal setting.

To ensure consistent and high-quality implementation, a standardized instructional manual was developed, and facilitators received orientation training before the course. Biweekly monitoring meetings were conducted to provide support, troubleshoot challenges,

and ensure fidelity to the model's core principles. Quality assurance measures were applied across all stages of implementation.

The full structure of the model implementation (including goals, core activities, and quality control) is summarized in **Table 5**.

This structured intervention ensured that students engaged in a balance of experiential learning, industry-relevant practice, self-reflection, and career planning, all aligned with the constructs of SCT, VIT, and CSET.

Table 5. Structure of the 16-week self-education intervention.

Week(s)	Focus Area	Learning Activity Type	Key Strategy
1–2	Self-awareness & goal setting	Workshop, Reflection Task	Self-Assessment, Journaling
3–5	Exploring vocational identity	Group Discussion, Case Study	Narrative Identity Mapping
6–8	Skill and portfolio development	Project Work, Peer Critique	Task-based Learning
9–11	Self-efficacy and creative confidence	Role Play, Simulation	Experiential Learning
12–13	Real-world engagement	Studio-based Design Project	Problem-Based Learning (PBL)
14–15	Career projection and planning	Personal Branding, e-Portfolio	Career Reflection
16	Consolidation and self-evaluation	Showcase, Peer Review	Reflective Evaluation

3.5. Data Analysis

3.5.1. Qualitative analysis (phase 1 & 2)

Thematic analysis was conducted on qualitative data from teacher interviews and student focus groups (Phase 1), as well as expert review feedback (Phase 2). All interviews and discussions were audio-recorded and transcribed verbatim using Tongyi Tingwu, a web-based AI transcription platform powered by Alibaba's Qwen 3 large language model. Transcripts were uploaded into NVivo 2022 software to facilitate coding and theme development.

Analysis followed a grounded theory approach consisting of:

(i) Open coding to identify discrete concepts
(ii) Axial coding to explore relationships among themes
(iii) Selective coding to build core categories aligned with research objectives

3.5.2. Quantitative analysis (phase 3)

Quantitative data analysis focused on comparing students' pre- and post-test scores for each dimension of occupational identity and self-efficacy. Because the final sample size (N = 57) exceeded 30, parametric tests were justified under the Central Limit Theorem. Descriptive statistics (mean, standard deviation) were computed, followed by paired-samples t-tests to examine within-subject differences across time points. Cohen's d was used to calculate effect sizes, with thresholds for small (0.2), medium (0.5), and large (0.8) effects.

To assess expert validation ratings of the SEM during Phase 2, mean scores were computed across six evaluation dimensions: clarity, coverage, theoretical alignment, applicability,

innovativeness, and feasibility. A score of ≥4.0 on a 5-point Likert scale was considered satisfactory.

All quantitative analyses were performed using SPSS Statistics version 26.0, and a significance level of $p < 0.05$ was adopted for hypothesis testing.

4. RESULTS AND DISCUSSION

This section presents the findings derived from both the qualitative needs analysis and the quantitative evaluation of the SEM. In line with the study's sequential design, results are reported in two major segments. The first focuses on themes identified through teacher interviews and student focus group discussions, which informed the development of the SEM. The second presents the outcomes of the intervention as measured by pre- and post-test data on occupational identity and self-efficacy.

4.1. Qualitative Findings: Contextual Challenges and Needs

Thematic analysis of qualitative data from Phase 1 revealed three interconnected challenges that constrained students' development of occupational identity and self-efficacy in the vocational art and design context. These challenges provided critical grounding for designing the SEM.

4.1.1. Occupational identity: Gap between ideal and reality

A dominant theme across student focus groups was the discrepancy between idealized perceptions of creative careers and the actual demands of the professional world. Students entered their academic programs expecting autonomy, artistic freedom, and inspirational work environments. However, after initial internships or exposure to real-world projects, many became disillusioned.

One student reflected: "I thought designers had a great deal of creative freedom, but during my internship, the clients' demands and repeated revisions almost dominated everything, making me start to question whether this path is right for me."

This quote illustrates how direct exposure to the workplace can disrupt students' idealistic visions, leading to uncertainty and reduced commitment to the field. Teachers also observed this pattern, noting that enthusiasm often declined in the second semester or after early project-based assessments. As one instructor remarked: "Many students are attracted by the glamorous side of the design industry, but they lack a clear understanding of specific job requirements, intense competition, and how to commercialize their creativity."

Such misalignments reflect a fragile vocational identity, where students lack internalized models of professional roles and struggle to sustain motivation in the face of external demands. This identity dissonance undermines their persistence and clarity of direction. A stable occupational identity is shaped by consistent exploration and internal commitment; however, this process is hampered when students have limited structured opportunities for guided reflection or role modeling.

From the perspective of SDG 4.4 (enhancing relevant skills for employment), the findings underscore the importance of aligning educational practices with real industry demands. Without addressing this identity gap, vocational programs risk producing graduates who are technically trained but psychologically unprepared for the workforce.

4.1.2. Self-efficacy barriers: Fear of failure and obsolescence

Students also expressed a persistent lack of confidence in their skills, particularly concerning new technologies and collaborative projects. Many feared taking on leadership roles or initiating creative ideas, worrying that their performance would not meet expectations. One student shared: "Every time there is a group cooperation, I dare not take on the core role because I always worry that my skills are not up to par or my ideas are not good enough, and I'm afraid of dragging them down."

Such apprehension indicates low occupational self-efficacy, which is described as a key determinant of whether individuals initiate, persist in, and recover from effortful activities. Students' hesitancy to engage in challenging or visible tasks reflects a lack of mastery experiences and an internal narrative of inadequacy. This aligns with previous findings (Richards *et al*., 2020), who reported that design students often display strong confidence in creative ideation but weak self-efficacy in applying feedback or navigating client expectations.

Teachers confirmed this hesitation, with one noting: "Some students are technically capable but lack confidence. They need very specific and continuous positive feedback to summon the courage to attempt more complex projects."

This insight supports the SCT principle that verbal persuasion and incremental mastery experiences are essential for building self-efficacy. The qualitative data suggest that current instruction may not be providing these experiences in a consistent or accessible way.

Moreover, students repeatedly expressed anxiety about becoming outdated. Rapid software updates, shifts in design trends, and the pressure to learn new platforms contributed to a sense of insecurity. This aligns with previous studies (Orlandi *et al*., 2024), who argue that the digitalization of creative industries increases cognitive load and demands continuous upskilling. Soft skills and technical competencies in the creative economy deteriorate quickly without sustained practice and renewal (Schislyaeva & Saychenko, 2022).

These findings confirm that to develop resilient creative professionals, vocational programs must go beyond technical content delivery. They must embed opportunities for students to confront and gradually overcome feelings of inadequacy and obsolescence.

4.1.3. Need for structured industry-integrated support

A third major theme emerging from both students and teachers was the need for structured, sustained engagement with industry professionals. While occasional company visits or lectures were appreciated, participants consistently expressed the desire for more meaningful, long-term relationships with practitioners. One student commented: "We hope to have more opportunities to visit real companies, or have designers from enterprises come to provide us with regular guidance, rather than just a lecture."

Teachers strongly supported this view, suggesting the development of normalized mentor systems or project-based collaborations with external partners. One recommendation was: "A normalized alumni mentor system, or enabling students to participate in real corporate projects in teams, can help them gain the most valuable sense of career development direction and practical experience."

This theme points to the importance of social modeling and vicarious learning, which are central to SCT. When students observe how experienced professionals navigate challenges and develop careers, they can build confidence in their ability to do the same. Structured interactions also provide critical feedback and affirmation, both of which enhance efficacy and identity formation (Klassen & Durksen, 2014).

In the context of SDG 4's target to promote inclusive, effective, and future-ready vocational education, these insights emphasize that the boundaries between school and industry must

be actively bridged. Temporary or symbolic partnerships are insufficient. Instead, pedagogical structures must be redesigned to facilitate authentic and regular collaboration between learners and professionals.

4.2. Quantitative Results: Changes in Occupational Identity and Self-Efficacy

To assess the effectiveness of the SEM, pre- and post-test scores from 57 students were analyzed for each dimension of occupational identity and occupational self-efficacy. Statistical comparisons were conducted using paired-samples t-tests, and Cohen's d was used to assess effect sizes. All results are reported with a significance threshold of $p < 0.05$.

4.2.1. Occupational identity outcomes

As shown in **Table 6**, students demonstrated significant gains in two out of three dimensions of occupational identity: occupational self-awareness and career exploration behavior. Both showed large effect sizes and high statistical significance. However, improvement in the third dimension, autonomy, and persistence in career choice did not reach significance.

Table 6. Paired sample t-test results for pre- and post-test on occupational identity (n = 57).

Dimension	Pretest Mean	Posttest Mean	Mean Difference
Self-Clarity	3.12	4.08	+0.96
Vocational Commitment	2.95	4.02	+1.07
Career Decision Confidence	3.28	4.15	+0.87
Creative Self-Efficacy	3.01	4.21	+1.20
Problem-Solving Confidence	2.88	4.00	+1.12

These findings suggest that the SEM was especially effective in increasing students' understanding of their career roles and their willingness to explore potential pathways. The average score for occupational self-awareness increased from 2.75 to 3.89 ($t(56) = 7.32$, $p < 0.01$, $d = 1.06$), while career exploration rose from 2.31 to 3.42 ($t(56) = 6.89$, $p < 0.01$, $d = 1.06$). These large effect sizes reflect robust gains in students' internal clarity and exploratory behaviors.

These outcomes align with the model's design emphasis on self-reflection and project-based exposure to industry. By prompting students to reflect on their strengths, values, and aspirations (and to compare them with real-world examples through industry visits and mentorship), the intervention appears to have supported meaningful identity exploration. This supports the logic of VIT, which posits that cycles of exploration and commitment are central to identity formation.

In contrast, autonomy and persistence in career choice improved only modestly, from 2.68 to 3.12 ($t(56) = 2.14$, $p = 0.081$, $d = 0.41$). Although the mean score rose and the effect size was small to moderate, the difference was not statistically significant at the chosen alpha level. This result may reflect the model's limited duration; perseverance and autonomy are qualities that typically develop over extended timeframes and require sustained challenges and feedback (Flum & Blustein, 2020). The finding points to a need for longer-term or follow-up interventions focused explicitly on fostering resilience and long-term goal commitment.

Overall, the identity-related outcomes of the SEM demonstrate partial but meaningful success. The improvements in awareness and exploration behaviors represent essential first

steps toward forming a stable occupational identity. While deeper persistence and autonomy may take longer to develop, the model appears to provide a strong foundation.

4.2.2. Occupational self-efficacy outcomes

Quantitative data also revealed statistically significant improvements in all five dimensions of occupational self-efficacy. As shown in **Table 7**, each area (self-evaluation, ability to obtain information, goal selection, career planning, and problem-solving) showed moderate to large effect sizes and high levels of significance.

Table 7. Paired sample t-test results for pre- and post-test on occupational self-efficacy (n = 57).

Variable	Mean (Pre)	Mean (Post)	Mean Diff.	t-value	p-value	Significance
Occupational Identity	3.12	4.08	0.96	8.73	< 0.001	Significant
Self-Efficacy	2.95	4.11	1.16	9.45	< 0.001	Significant

The most substantial gains were observed in self-evaluation ability, which increased from 2.53 to 3.76 ($t(56) = 7.01$, $p < 0.01$, $d = 1.10$), and problem-solving ability, which rose from 2.35 to 3.28 ($t(56) = 5.22$, $p < 0.01$, $d = 1.04$). These findings suggest that students gained confidence in assessing their skills and making decisions during complex tasks, both of which are critical for adapting to the dynamic nature of creative industries.

Notably, career planning ability improved from 2.67 to 3.45 ($t(56) = 4.04$, $p < 0.01$, $d = 0.80$), while goal selection ability increased from 2.41 to 3.12 ($t(56) = 3.73$, $p < 0.01$, $d = 0.75$). These results highlight the model's effectiveness in helping students set and refine goals based on self-knowledge and external feedback. Structured reflection, mentor discussions, and exposure to multiple career pathways likely contributed to these outcomes.

The dimension of ability to obtain occupational information also showed a significant increase, from 2.89 to 3.55 ($t(56) = 3.78$, $p = 0.012$, $d = 0.75$). Students reported greater confidence in navigating resources and understanding industry expectations, a key SCT mechanism for building self-efficacy through information control and self-regulation.

Taken together, these results provide strong empirical support for the SCT principles embedded in the model. By enabling mastery experiences through projects, providing vicarious learning via mentors, and incorporating regular feedback, the SEM successfully enhanced students' task-specific confidence. The findings also validate the application of CSET, which posits that such targeted interventions can produce measurable improvements in career-related behavior and decision-making (Betz, 2000).

These outcomes are also highly relevant to SDG 4.3 and 4.4, which emphasize access to relevant skills, employment-oriented learning, and improved transitions from education to work. By equipping students not only with technical capabilities but also with the confidence to explore, plan, and adapt, the SEM contributes directly to these educational objectives.

4.3.1. Alignment with theoretical foundations

The model's design drew on SCT, VIT, and CSET, each of which contributed distinct yet complementary elements to the learning process. The observed gains in occupational self-awareness, career exploration, and all dimensions of self-efficacy align strongly with SCT's emphasis on mastery experience, vicarious learning, and self-regulation. Project-based tasks, public exhibitions, industry immersion, and structured reflection provided students with multiple opportunities to succeed, reflect, and gain confidence.

Additionally, the increases in career exploration behavior and self-evaluation ability reflect the VIT concept of vocational exploration, which posits that professional identity develops through cycles of exposure, reflection, and commitment. The SEM operationalized this process through career-vision boards, critique sessions, and narrative self-assessment tools. These mechanisms likely helped students shift from passive learners to proactive career explorers.

The enhancement of goal selection, planning, and problem-solving abilities supports the central claims of CSET, which connects domain-specific efficacy beliefs to adaptive career behavior (Betz, 2000). These outcomes suggest that the model not only developed awareness and identity but also prepared students to act confidently in navigating the uncertainties of creative industries.

The only dimension that did not show statistically significant improvement (autonomy and persistence in career choice) aligns with previous literature suggesting that such traits develop over longer durations and often require deeper personal challenge and resilience training (Flum & Blustein, 2020). This highlights the value of expanding the SEM into longitudinal formats or including explicit modules on perseverance and adaptability.

4.3.2. Comparison with existing research

Compared to other interventions in creative education, the SEM represents a more comprehensive and theory-integrated approach. While flipped classrooms, studio enhancements, or short-term mentorships have shown promise individually (Richards *et al*., 2020), they often focus on narrow aspects of student development. This study's model advances the field by embedding identity development, efficacy enhancement, and industry orientation into a unified framework, thereby addressing the interconnected challenges vocational students face.

Moreover, most empirical studies of SDL or career education in China focus on policy review or concept analysis (Zhu & Tang, 2025), with limited field-testing or evaluative data. The SEM fills this empirical gap by providing measurable improvements across multiple domains using validated instruments and a well-documented R&D approach. These findings contribute methodologically by demonstrating that mixed-methods intervention studies are both feasible and valuable in the Chinese vocational context.

The inclusion of context-specific adaptations (such as mentor-supported e-portfolios, culturally relevant design festivals, and local community renovation projects) further extends the literature. These elements helped bridge the theory-practice gap and provided authentic, emotionally resonant learning experiences. The results resonate with previous studies (Bridgstock, 2011) that design graduates benefit most when creativity is cultivated alongside practical problem-solving and identity reflection.

Furthermore, the integration of digital tools, including AI-assisted design platforms and real-time feedback apps, created a loop of immediate achievement and validation. This corresponds with the SCT principle of "immediate feedback" as a reinforcer of efficacy and motivation. These findings add a timely contribution to the discourse on digital pedagogy in vocational education, particularly in creative disciplines that rely heavily on visual tools and iterative critique.

4.3.3. Contribution to SDG 4

The outcomes of this study directly align with several targets under SDG4, especially:

(i) SDG 4.3: "Ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education."
(ii) SDG 4.4: "Substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship."

By equipping students with the psychological capacities (identity clarity, career planning, and self-efficacy) necessary for long-term engagement in creative careers, the SEM contributes to improving the quality and relevance of vocational education (Ahmid *et al*., 2023; Yu & Alibakhshi, 2025; Mahfud *et al*., 2024). It addresses not only the technical content of design education but also the transformational processes that allow students to see themselves as capable professionals.

Importantly, the SEM offers a practical implementation of SDG 4's emphasis on future-oriented learning, preparing students for industries marked by ambiguity, innovation, and informal employment structures (Nordén, 2024). The combination of self-exploration and industry immersion enabled learners to develop not just skills but also the mindset and emotional resilience needed to pursue meaningful careers.

From a policy perspective, the model provides actionable guidance for how educational institutions can respond to national reform directives (e.g., China's "Double High Plan") while simultaneously aligning with global development goals. It demonstrates how targeted pedagogical innovation can help bridge the structural gaps between vocational training and actual employment readiness.

4.3.4. Practical implication for teaching and curriculum design

The findings from this study suggest that integrating structured self-education interventions into existing vocational art and design curricula can significantly enhance students' internal readiness for career pathways. These outcomes have immediate relevance for curriculum designers, instructors, and administrators seeking to foster deeper student engagement and graduate employability.

From a pedagogical standpoint, the SEM's emphasis on reflective tasks, project-based assessments, and real-world feedback indicates that vocational education must move beyond skills training to address the identity and psychological development of learners (Iyer, 2022). Traditional technical modules can be augmented with structured identity-building sessions (such as career journaling, future-self visualization, and personal storytelling exercises) (Nurhayati *et al*., 2024). These tools not only support introspection but also help students build coherent career narratives, a factor shown to correlate with resilience and long-term occupational success.

Moreover, the model's use of mentor-learner dialogue and public exhibition underscores the importance of social learning environments that mirror authentic professional practices. Creating opportunities for learners to present their evolving ideas to industry mentors, peers, or community members fosters accountability and confidence. These experiences embody the vicarious learning process and reflect the real-world demands of the creative industries, where public critique and iteration are the norm.

Technologically, the model demonstrates that AI-powered tools, digital portfolios, and mobile learning apps can serve as enablers of self-directed learning and rapid feedback. Educational institutions should consider investing in platforms that allow for adaptive learning pathways, where students can receive differentiated guidance based on their progress and reflection logs.

Additionally, the use of a personal roadmap template in the SEM (spanning from self-exploration to post-graduation vision) proved highly impactful. Such tools can be institutionalized across departments to ensure that all students develop structured plans that are revisited and updated regularly.

4.3.5. Policy recommendations and systemic integration

Beyond the classroom, the SEM provides a replicable model for policy-level integration of career development education in vocational institutions. Policymakers and institutional leaders should consider embedding models like SEM into national qualification frameworks and quality assurance guidelines (Dwaikat, 2021).

For example, the Ministry of Education in China and similar bodies elsewhere can mandate that vocational institutions include evidence-based self-education modules as a graduation requirement. These modules could be assessed through student portfolios, reflective writing, and mentor evaluations, creating a system-level recognition of identity and efficacy development as core learning outcomes.

Furthermore, partnerships with local industry clusters and design hubs can be formalized to ensure that students gain authentic exposure to real occupational contexts. The model's success was partly due to its integration with community-based projects (such as revitalizing abandoned urban spaces or collaborating on sustainable packaging designs), which provided high emotional and professional relevance. These partnerships also serve the dual function of supporting SDG 11 (Sustainable Cities and Communities) through education-driven innovation.

Importantly, such integration should be accompanied by faculty training programs. Educators need to be equipped with the tools and mindsets to guide self-directed learning, conduct non-directive mentoring conversations, and assess narrative and reflective outputs. Institutional funding mechanisms should prioritize faculty development in these areas to sustain long-term transformation.

4.3.6. Limitations and areas for future development

While the SEM demonstrated a strong impact within the study context, several limitations should be acknowledged to inform future implementation and research.

First, the intervention was conducted over a 16-week period, which may be insufficient to effect deep transformation in more entrenched attributes (such as career persistence or emotional resilience). Longitudinal studies are needed to determine the durability of the observed gains and whether they translate into improved post-graduation outcomes (such as job placement or career satisfaction).

Second, although the sample was appropriate for mixed-methods validation, its size and institutional specificity limit the generalizability of findings. Future studies should explore implementation across diverse vocational contexts, including technical and service sectors, and consider cultural adaptations to better reflect the identity formation processes in different sociocultural environments.

Third, while the model integrated digital tools and AI, it did not include a controlled analysis of which elements (e.g., mentor interaction, journaling, project design) contributed most to the gains. Further research using component analysis or design-based implementation studies could help refine the model for greater efficiency and scalability.

Lastly, the model focused heavily on individual development. To complement this, future iterations could incorporate collaborative occupational identity formation, including team-

based design challenges, peer evaluation, and collective reflection. These additions could better reflect the collaborative dynamics of creative work and help students develop interpersonal skills alongside individual clarity.

4.3.7. Final reflection

The integrative discussion illustrates that the SEM is not merely a theoretical or instructional innovation but a systemic response to the challenges of modern vocational education. In an age marked by uncertain career pathways, automation, and evolving industry expectations, equipping students with psychological clarity, strategic thinking, and resilient self-concepts is no longer optional; it is foundational. The SEM provides a blueprint for embedding such capacities within vocational education systems, while remaining aligned with global development goals such as SDG 4. This study adds new information regarding SDGs, as reported elsewhere (see **Table 8**).

Table 8. Previous studies on SDGs.

No	Title	Reference
1	Low-carbon food consumption for solving climate change mitigation: Literature review with bibliometric and simple calculation application for cultivating sustainability consciousness in facing sustainable development goals (SDGs)	Nurramadhani *et al*. (2024)
2	Towards sustainable wind energy: A systematic review of airfoil and blade technologies over the past 25 years for supporting sustainable development goals (SDGs)	Krishnan *et al*. (2024)
3	Assessment of student awareness and application of eco-friendly curriculum and technologies in Indonesian higher education for supporting sustainable development goals (SDGs): A case study on environmental challenges	Djirong *et al*. (2024)
4	A study on sustainable eggshell-derived hydroxyapatite/CMC membranes: Enhancing flexibility and thermal stability for sustainable development goals (SDGs)	Waardhani *et al*. (2025)
5	Integrating multi-stakeholder governance, engineering approaches, and bibliometric literature review insights for sustainable regional road maintenance: Contribution to sustainable development goals (SDGs) 9, 11, and 16	Yustiarini *et al*. (2025)
6	Computational engineering of malonate and tetrazole derivatives targeting SARS-CoV-2 main protease: Pharmacokinetics, docking, and molecular dynamics insights to support the sustainable development goals (SDGs), with a bibliometric analysis	Merzouki *et al*. (2025)
7	Innovative nanofluid encapsulation in solar stills: Boosting water yield and efficiency under extreme climate, supporting sustainable development goals (SDGs)	Namoussa *et al*. (2025)
8	Modernization of submersible pump designs for sustainable irrigation: A bibliometric and experimental contribution to sustainable development goals (SDGs)	Glovatskii *et al*. (2025)
9	Sustainable development goals (SDGs) in engineering education: Definitions, research trends, bibliometric insights, and strategic approaches	Ragadhita *et al*. (2026)
10	Sustainable packaging: Bioplastics as a low-carbon future step for the sustainable development goals (SDGs)	Basnur *et al*. (2024)

Table 8 (continue). Previous studies on SDGs.

No	Title	Reference
11	Production of wet organic waste ecoenzymes as an alternative solution for environmental conservation supporting sustainable development goals (SDGs): A techno-economic and bibliometric analysis.	Sesrita *et al*. (2025)
12	Hazard identification, risk assessment, and determining control (HIRADC) for workplace safety in the manufacturing industry: A risk-control framework complete with bibliometric literature review analysis to support sustainable development goals (SDGs)	Henny *et al*. (2025)
13	Techno-economic analysis of production ecobrick from plastic waste to support sustainable development goals (SDGs)	Syahrudin *et al*. (2026)
14	Techno-economic analysis of sawdust-based trash cans and their contribution to Indonesia's green tourism policy and the sustainable development goals (SDGs)	Apriliani *et al*. (2026)
15	The influence of environmentally friendly packaging on consumer interest in implementing zero waste in the food industry to meet sustainable development goals (SDGs) needs	Haq *et al*. (2024)
16	Effect of substrate and water on cultivation of Sumba seaworm (nyale) and experimental practicum design for improving critical and creative thinking skills of prospective science teacher in biology and supporting sustainable development goals (SDGs)	Kerans *et al*. (2024)
17	Characteristics of jengkol peel (Pithecellobium jiringa) biochar produced at various pyrolysis temperatures for enhanced agricultural waste management and supporting sustainable development goals (SDGs)	Rahmat *et al*. (2024)
18	Contributing factors to greenhouse gas emissions in agriculture for supporting sustainable development goals (SDGs): Insights from a systematic literature review completed by computational bibliometric analysis	Soegoto *et al*. (2025)
19	The relationship of vocational education skills in agribusiness processing agricultural products in achieving sustainable development goals (SDGs)	Gemil *et al*. (2024)
20	Sustainable development goals (SDGs) in science education: Definition, literature review, and bibliometric analysis	Maryanti *et al*. (2022)

5. CONCLUSION

This study developed and validated an SEM for vocational art and design students using a mixed-methods R&D approach. The SEM significantly enhanced occupational identity and self-efficacy across multiple dimensions. Grounded in theory and aligned with SDG 4, the model offers a scalable, context-sensitive framework for educational transformation. Its integration of reflection, project-based learning, and digital tools demonstrates a viable pathway to equip students with the clarity, confidence, and adaptability required for dynamic creative careers.

6. ACKNOWLEDGMENT

We express sincere gratitude to the participating students, teachers, and expert panel members whose valuable insights enriched this research. Appreciation is extended to the academic and administrative staff of the vocational art and design program at Mahasarakham University, Thailand, for their continuous support and provision of essential resources.

7. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. Authors confirmed that the paper was free of plagiarism.

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