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The Development of a Learning Management Prototype to Enhance Primary Students' Ability to Discover Career Paths

Pitsanu Rodkomin[1], Natthapol Jaengaksorn[1], Pornsuda Insan[1] & Nuttanun Niwesworakarn[1,*]

[1]Faculty of Education, Chiang Mai University, Chiang Mai, Thailand

*Correspondence: Nuttanun Niwesworakarn, Faculty of Education, Chiang Mai University, 239 Huay Kaew Road, Suthep, Mueang Chiang Mai, Chiang Mai 50200, Thailand. E-mail: ed.nuttanun@gmail.com

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Abstract

Career path discovery constitutes a fundamental component of human development, particularly during the primary school years when self-concept and personal identity begin to form. This study aimed to 1) develop a learning management prototype to enhance primary students' career path discovery ability, and 2) examine the effects of implementing this prototype. The research involved 599 fourth through sixth grade primary school students and 17 teachers across northern Thailand. The teachers completed a 30-hour professional development workshop prior to designing their own context-responsive lesson plans grounded in the prototype. Students' abilities were evaluated before and after the intervention using a 20-item self-assessment scale covering five core indicators of career path discovery ability. The findings revealed that: 1) The learning management prototype comprises instructional techniques and methods organized around six core guidelines. It allowed teachers to tailor instructional designs to their specific school contexts. The prototype was evaluated for content validity and appropriateness by five educational experts, all of whom rated it at the highest level across all criteria. 2) Following the intervention, students demonstrated marked improvements across all indicators. The proportion of students achieving the high ability level increased in every dimension, led by self-awareness (+25.04%), followed by evaluation (+21.20%), comparison (+21.20%), analysis (+20.87%), and goal identification (+19.20%). Furthermore, teacher interviews highlighted operational challenges, obstacles, and constructive recommendations. These findings demonstrate that the prototype effectively enhances primary students' career path discovery and planning abilities, offering a viable pedagogical framework for educators seeking to cultivate career awareness and readiness in early education.

Keywords: ability to discover career path, learning management prototype, primary student

1. Introduction

Discovering one's own career path is a crucial component of human development (Savickas, 2005) and also serves as a fundamental foundation for stability in life (Hartung, 2021). In particular, individuals' capacity to identify their abilities, aptitudes, and interests directly influences their educational planning, skill development, and selection of careers suited to their unique life contexts (Bandura, 1997; Lent & Brown, 2008). Career exploration during the primary school years is particularly significant in this regard, as it aligns with students' psychosocial and cognitive development during this formative stage (Gottfredson, 2005; Rojewski, 2021; Turner & Lapan, 2005). Moreover, students aged 10 to 12 are increasingly able to recognize their own potential and interests as their self-awareness continues to develop (Super, 1980). When provided with appropriate support, these students are able to develop the self-understanding and confidence necessary for long-term life planning (Turner & Lapan, 2005). This suggests that providing primary school students with opportunities to explore a variety of career paths can help them envision their future and make decisions informed by their interests and contextual realities (Park et al., 2021). Accordingly, cultivating young people's ability to discover and develop their own skills from an early age is considered a vital strategy for preparing them to become well-rounded citizens of the 21st century (Trilling & Fadel, 2009, as cited in Metz & Gardner, 2021; Rojewski, 2021).

Despite its importance, the promotion of primary school students' ability to discover career paths remains insufficiently emphasized in both curriculum design and classroom practice (Sneed et al., 2026). Although the Thai

Ministry of Education has established policies addressing career awareness from the primary level onward through the Basic Education Core Curriculum and guidelines issued by the Office of the Basic Education Commission (Office of the Basic Education Commission, 2018) in practice, these policies are often not translated into learning processes systematic or in-depth enough to enable students to genuinely discover their own potential (Intawong, 2020). Furthermore, many teachers face challenges in organizing activities that promote students' self-discovery, owing to a lack of direct professional training in guidance counseling and a shortage of effective tools or exercises for assessing this ability (Sneed et al., 2026; Yodsuwan et al., 2021). As a result, learning experiences at the primary level frequently remain confined to traditional, exam-oriented academic content and do not proactively foster career awareness or genuine self-exploration (Ellott et al., 2024; Intawong, 2020).

This gap between policy demands and actual classroom practice highlights a pressing need for the development of learning management that promotes primary school students' ability to discover career paths (Wulandari et al., 2026). An effective learning management approach should be grounded in self-efficacy theory, which explains how individuals develop confidence in their own abilities through exploration, reflection, and engagement with challenging experiences. This helps form an essential foundation for adaptability, decision-making, and planning that connects to real-world careers (Bandura, 1986; Hackett & Betz, 1981). While these principles are well-acknowledged in theory, there remains a lack of concrete, empirically validated models and assessment tools designed specifically for use in primary education settings (Porfeli et al., 2008). As a result, the promotion of career path discovery among younger students remains insufficiently explored, with no clear conclusions established in practice (Watson et al., 2015).

Based on these concepts and contexts, the necessity emerges for developing a prototype of learning management that actively enhances primary students' ability to discover their own career paths. Such a prototype aims to provide a clear and systematic approach to instruction and assessment that is practical and adaptable within the context of primary schools. Moreover, it will serve as an operational guideline for teachers, enabling them to further develop and tailor career discovery activities to suit the varying needs of their students effectively and efficiently.

2. Research Objectives

2.1 To develop a learning management prototype that promotes the ability to discover career paths among primary school students.

2.2 To examine the effects of using the learning management prototype that promotes the ability of primary school students to discover their own career paths.

3. Method

3.1 Research Design

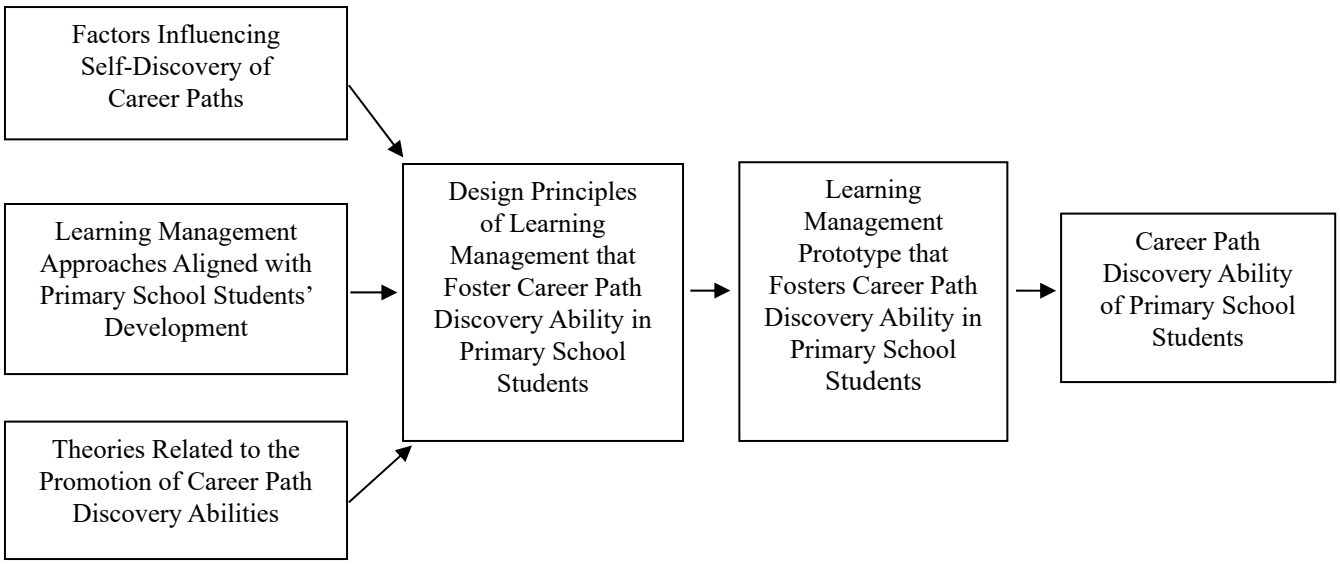


Figure 1. Research Framework

This research was divided into two phases according to the research objectives: Phase 1, designing and developing a learning management prototype that promotes primary school students' ability to discover their own career paths. Phase 2, implementing the prototype and examining the effects of the learning management prototype in promoting primary school students' ability to discover their own career paths. To be concise, Figure 1 indicates the research framework.

3.2 Participants

The participants were 599 grade fourth through sixth primary students selected through voluntary sampling. The teachers provided information sheets of the research study to the students, then they were encouraged to take it back and consult with their parents whether they would like to participate in the study or not. The inclusion criteria are

1. Enrolled in Grades 4 through 6, aged 10 – 12 years.
2. Willing and consented to participate in the study.
3. Able to attend at least 80 percent of the instructional sessions.

3.3 Teachers (Who Implement the Prototype)

Seventeen teachers were selected to participate in the training on the learning management prototype, which they subsequently implemented through the design of their own lesson plans (see the results section for information about the prototype). To recruit teachers for the study, the author team announced the training program via the Faculty of Education's Facebook page, which has 4.6 thousand followers, and distributed posters to many schools in northern Thailand. Out of 60 applicants, 20 teachers were randomly selected using a random sampling technique. However, during the training sessions, three teachers dropped out, leaving 17 teachers who completed the training and participated in the 30-hour workshop via Mango Structure, a learning management system (LMS). Designed to build teachers' understanding of the developed prototype, the workshop was structured across three core chapters, as indicated in Table 1.

Table 1. Structure of the Teacher Training Workshop for Enhancing Understanding of Prototype Implementation

Week	Content	Objectives
1 – 3	Career Development Theory, Theory of Multiple Intelligences, Self-Efficacy Theory, and Behavioral Psychology Theory	To provide teachers with a foundational understanding of the necessity of fostering career exploration abilities in primary school students, and to help them grasp the core principles behind supporting students.
4 – 5	Design methods for tools used in analyzing student aptitudes, interests, and conducting student surveys	To equip teachers with practical tools to analyze students' aptitudes, interests, and capabilities, providing baseline data for designing instructional plans.
6 – 10	Design principles in instructional design prototypes, teaching techniques, pedagogical methods, and lesson examples for primary school students	To enable teachers to understand the techniques and instructional methods for each key principle in the model, leading to effective adaptation and lesson design tailored to their school's context.

Following the workshop, the teachers adapted the prototype into their own instructional plans for classroom implementation. While teachers were permitted to contextualize the prototype to suit their specific instructional settings, all designed learning activities were required to strictly align with every guideline of the prototype. The lesson plans were expected to span 8-10 class periods. Throughout the instructional design process, the research team served as mentors and provided ongoing feedback to ensure comprehensive alignment between the proposed learning activities and the prototype framework. Teacher demographics and profiles are presented in Table 2.

Table 2. Teachers' Information (ordered by age)

No.	Gender	Age	Highest Degree of Study	Field of Expertise	Years of Experience
1	Female	26	Bachelor	Elementary	3
2	Male	27	Bachelor	Elementary	4
3	Female	28	Bachelor	English	4
4	Female	29	Bachelor	Elementary	5
5	Prefer not to respond	30	Bachelor	Thai	6
6	Female	31	Master	Elementary	8
7	Male	32	Bachelor	Mathematics	8
8	Female	34	Master	Science	10
9	Female	36	Master	Social Studies	11
10	Female	37	Bachelor	Elementary	13
11	Male	38	Master	Elementary	14
12	Female	40	Bachelor	Home Economics	16
13	Female	41	Master	Elementary	16
14	Female	44	Master	Thai	21
15	Male	46	Master	Science	22
16	Female	48	Bachelor	Elementary	24
17	Male	49	Master	Elementary	25

3.4 Research Instruments

Since there are two phases of the research study, the research instruments were divided accordingly.

3.4.1 Evaluation Form of the Content Validity and Appropriateness of Design Principles for Promoting Career Path Discovery

After the design principles of learning management that promotes primary school students' ability to discover their own career paths had been conceptualized from literature, a panel of five experts evaluated these principles for alignment and contextual suitability: two specialists in psychology and student guidance, one in primary education learning management, one in instructional design, and one in educational research. To determine content validity between the proposed principles and career path discovery, the panel evaluated each principle using the Item-Objective Congruence (IOC) index. Appropriateness was assessed using a 5-point Likert scale. The items were divided into four main sections: content appropriateness, content clarity, feasibility for implementation, pedagogical value in current educational practice.

3.4.2 Evaluation Form of the Content Validity and Appropriateness of Prototype for Promoting Career Path Discovery

This instrument was administered to evaluate both the content validity and the appropriateness of the developed prototype. The panel of five experts conducted the review: two in psychology and student guidance, one in primary education learning management, one in instructional design, and one in educational measurement, evaluation, and research. The evaluation required the experts to assess the prototype's alignment with the previously established learning management principles. Additionally, its appropriateness was measured using a 5-point Likert scale. The items were divided into three main sections: content comprehensiveness, content clarity, and feasibility for implementation as teacher guidelines.

3.4.3 Self - Evaluation Form of Ability to Discover Career Paths for Primary School Students

This self-evaluation form was developed by the authors. It was used before and after the implementation of learning management based on the lesson plans developed from the prototype, consisting of a 20-item questionnaire (see Appendix A). Students were asked to respond according to a three-point rating scale, reflecting the extent to which

each behavior is exhibited: This is truly me (3), This is me to some extent (2), and This is not me (1). The question items were conceptualized from Taylor and Betz's (1983) and Osborn et al.'s (2023) frameworks regarding the components of the ability to discover career paths. Each indicator contains 4 items, as shown in Table 3.

Indicator 1: Awareness of one's own aptitudes or interests through participation in various activities or tasks.

Indicator 2: Evaluation of one's own aptitudes or interests based on participation in various activities or tasks.

Indicator 3: Comparison of one's own aptitudes or interests with the characteristics of different types of careers.

Indicator 4: Analysis of the suitability between characteristics of careers and one's own aptitudes or interests.

Indicator 5: Identification of goals to develop one's own aptitudes or interests for the desired future career.

Table 3. The Relationship between Indicators and Questions

No.	Statement	Indicator
1	I can say whether I like or dislike the activities or tasks done in the classroom.	1
2	I can state what I did well from past classroom activities or tasks.	1
3	I can describe in detail what I did well in classroom activities or tasks.	1
4	I can explain the reasons why I like certain classroom activities or tasks.	1
5	I can express the level of enjoyment in classroom activities or tasks.	2
6	I can name my top three favorite or best-done classroom activities or tasks.	2
7	If the teacher invites me to do several classroom activities, I can say which one I liked or did best.	2
8	After completing classroom activities or tasks, I can state how I should develop myself further.	2
9	When thinking of my dream career, I know what aspects of myself I need to consider.	3
10	I can identify which careers match what I like or do well.	3
11	I can state what is required to do in each career.	3
12	If I like drawing, I can say which careers it matches.	3
13	If I have to choose my dream career, I can explain why it is suitable for me.	4
14	If I dislike something about a career, I will place it near the bottom of my dream career list.	4
15	If I hear the job descriptions for various careers, I can say if I would be able to do them.	4
16	If someone suggests a career for me, I can say whether it matches me or not.	4
17	If I know my dream career, I know what I need to develop in myself.	5
18	If there is something I like but am not good at yet, I will practice it more.	5
19	I like to ask teachers or do my own research on what I need to improve for my dream career.	5
20	If I encounter an activity I like or do well that matches my dream career, I will do my best.	5

The evaluation instrument was administered in Thai. During data collection, teachers read the items aloud with students and clarified any questions. Content validity was evaluated using the IOC, with all items scoring above 0.67, indicating high alignment. In addition, Cronbach's Alpha Coefficient was employed to measure reliability, yielding a value of 0.76, which is considered an acceptable level.

3.4.4 Semi-structured Teacher Interview on the Prototype

This semi-structured interview aimed to investigate three core aspects of teachers' experiences in conducting the prototype. Due to its semi-structured format, follow-up questions were asked to explore deeper information regarding teachers' experiences. The main interview questions consisted of three items: (1) difficulties or challenges in designing and managing learning, (2) aspects of the prototype that teachers still found unclear, and (3) limitations encountered in managing learning with the prototype. The interviews were conducted individually with 17 teachers, either onsite at each teacher's school or online via Zoom, depending on the teacher's preference. All interviews were conducted in Thai and video-recorded (via onsite video recording or Zoom meeting recording) to allow the researchers to transcribe the data for analysis.

3.5 Research Procedures

Phase 1

1. Review related literature and synthesize learning management principles that promote the career path discovery ability of primary school students.
2. Assess the content validity and appropriateness of the principles through expert evaluation using Evaluation Form of the Content Validity and Appropriateness of Learning Management Principles for Promoting Career Path Discovery.
3. Develop the prototype based on the core principles and examine its content validity and appropriateness by using Evaluation Form of the Content Validity and Appropriateness of Prototype for Promoting Career Path Discovery.

Phase 2

4. Create promotional posters and related documents to be sent to schools in Northern Thailand.
5. Randomly select 20 teachers (17 teachers until the end).
6. Conduct teacher training workshop, 3 hours a week, 30 hours in total (10 weeks).
7. Administer a Self - Evaluation Form before implementing the prototype.
8. Implement the prototype over approximately 8–10 class periods. The number of periods may vary depending on the teacher's approach, but it still follows the core principles.
9. Administer a Self - Evaluation Form after implementing the prototype.
10. Interview teachers using semi-structured teacher interview on the prototype.
11. Analyze the data.

3.6 Data Analysis

The content validity was evaluated using the Index of Item-Objective Congruence (IOC), based on a three-point rating scale: +1 for congruent, 0 for uncertain, and -1 for not congruent. Items with an IOC value of 0.67 or higher were accepted.

The appropriateness was evaluated using the mean and standard deviation (SD). To be acceptable for implementation, an item was required to achieve a mean score of at least 3.40 (a high level of appropriateness). The interpretation criteria for appropriateness levels were established as follows:

4.20 to 5.00 represents the highest level of appropriateness.

3.40 to 4.19 represents a high level of appropriateness.

2.60 to 3.39 represents a moderate level of appropriateness.

1.80 to 2.59 represents a low level of appropriateness.

1.00 to 1.79 represents the lowest level of appropriateness.

Data were derived from students' self-assessments across five indicators, each comprising four items measured on a 3-point rating scale. Mean scores were calculated and categorized into three levels using equal intervals: high (2.34–3.00), moderate (1.67–2.33), and low (1.00–1.66). The instructor recorded the number of students at each level both before and after the instructional intervention. These frequencies were subsequently converted into percentages and percentage differences to examine trends in student development. Because the pre- and post-implementation responses could not be paired, inferential statistics were not applicable, as individual-level variance across time could not be tracked and parametric assumptions were not met. Consequently, only descriptive statistics were utilized to illustrate the trends and percentage changes across each indicator.

Data obtained from teacher interviews were analyzed using content analysis. To establish trustworthiness, a member checking process was conducted, allowing the teachers to review the summary of the content analysis and verify that it accurately reflected their experiences.

4. Results

4.1 The Learning Management Prototype to Enhance Primary Students' Career Pathway Discovery Ability

The six design principles synthesized from the literature review were developed into a learning management prototype comprising six core guidelines, as illustrated in Figure 2. Each principle encompasses specific instructional techniques and methods that facilitate classroom-level implementation. The details of each core principle and prototype are described as follows.

Guideline 1: Organizing activities aligned with students' multiple intelligence aptitudes and preferences. This guideline was developed from Design Principle 1, which was synthesized from Gardner's (2011) theory of multiple intelligences. It involves designing learning activities that account for individual differences in cognitive profiles and personal potential. By offering opportunities for students to employ their diverse aptitudes in learning and self-expression, this principle fosters the discovery and development of students' genuine potential.

Guideline 2: Providing opportunities for students to reflect on their aptitudes, preferences, or emotions, and to make decisions based on their experiences. This guideline was developed from Design Principle 2, which was synthesized from self-concept, self-assessment concepts, and career development theories (Lowman, 2022; Super, 1980). It establishes activities that facilitate experiential reflection and analysis. Students identify personal aptitudes and preferences that subsequently serve as foundational data for linking to related career characteristics.

Guideline 3: Delivering career-related feedback connected to the preferences or aptitudes students utilize during activities. This guideline was derived from Design Principle 3, which was synthesized from career-ability linkage concepts and career development theories (Lowman, 2022; Super, 1980). It provides targeted information and guidance that explicitly connects instructional activities to prospective career pathways. This enables learners to develop clearer understanding and construct reasoned associations between their abilities and future occupations.

Guideline 4: Emphasizing problems, questions, or scenarios to scaffold problem-solving, decision-making, and self-reflection. This guideline was developed from Design Principle 4, which was synthesized from Bandura's (1997) construct of enactive mastery experience. It creates challenging learning environments through authentic tasks, problems, or real-world scenarios. Students practice analytical thinking, decision-making, and self-reflection in alignment with critical choice points encountered in everyday life.

Guideline 5: Providing positive reinforcement, building self-confidence, and encouraging students to demonstrate their abilities. This guideline was grounded in Design Principle 5, which was synthesized from verbal persuasion and operant conditioning principles (Bandura, 1997; Skinner, 1953). This guideline employs constructive reinforcement, praise, encouragement, and affirmation. These strategies cultivate self-confidence and positive self-efficacy beliefs, encouraging students to actively engage in continuous learning and self-development.

Guideline 6: Promoting collaborative activities that expose students to diverse perspectives and social skills. This guideline was developed from Design Principle 6, which was synthesized from Bandura's (1997) vicarious experience and Selman's (1980) social perspective-taking theory. It offers collaborative opportunities for students to exchange viewpoints and learn from social diversity. The focus is placed on cultivating interpersonal communication, empathy, and acceptance of differing perspectives, mirroring authentic collaborative workplace dynamics.

The design principles were evaluated by five experts to assess their content validity and appropriateness in fostering students' ability to discover career paths. The IOC yielded a score of 1.00 across all principles. Furthermore, the appropriateness ratings ranged from 4.25 to 5.00, falling within the highest level of appropriateness. These results confirmed that the principles were fully aligned with the theoretical framework and provided a sound foundation for developing students' career path discovery ability. Subsequently, the prototype was developed based on these design principles. The content validity of the prototype was evaluated at 1.00 across all items, while the appropriateness of all items was rated between 4.33 and 4.67, indicating the highest level of appropriateness.

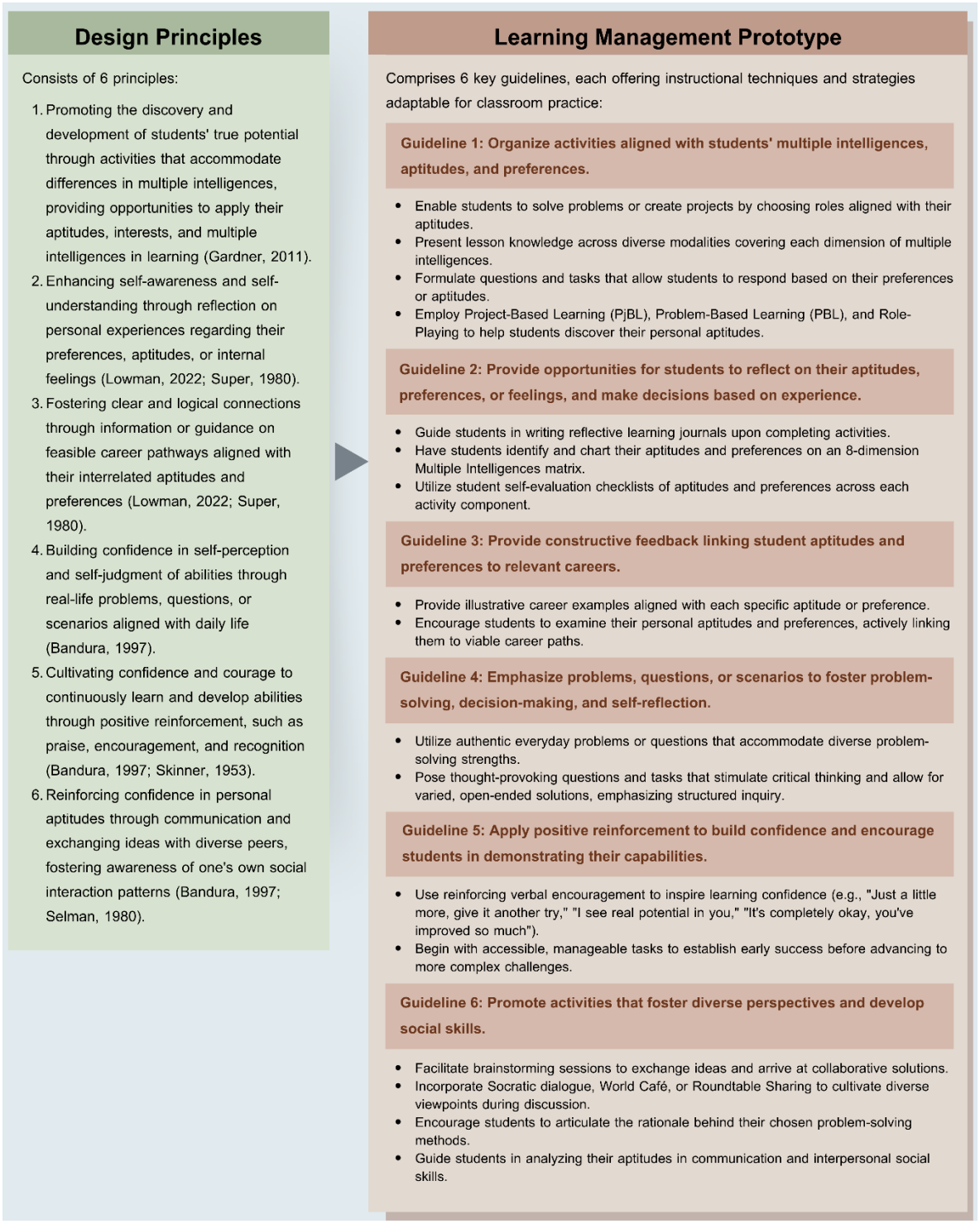


Figure 2. Design Principles and Prototype

4.2 Effects of Using the Learning Management Prototype to Enhance Ability to Discover Primary School Students' Career Pathway

The effects of the learning management prototype on enhancing primary school students' career pathway discovery ability are presented in two parts: students' self-evaluation and qualitative findings from teacher interviews.

For the students' self-evaluation, frequency and percentage were calculated to show the differences of primary school

students' career path discovery ability before and after intervention implementation. As mentioned, the ability to discover career paths is classified into 5 different indicators. Therefore, the results are presented according to each indicator, as indicated in Table 4.

Table 4. Frequency and Percentage of Ability of Primary School Students to Discover Their Own Career Paths Before and After Use of the Intervention (n = 599)

Indicator	Level	Frequency		Percentage		Difference in percentage
		Before	After	Before	After	
1: Awareness of one's own aptitudes or interests through participation in various activities or tasks	High	202	352	33.72	58.76	+25.04
	Mid	296	215	49.42	35.89	-13.52
	Low	101	32	16.86	5.34	-11.52
2: Evaluation of one's own aptitudes or interests based on participation in various activities or tasks	High	229	356	38.23	59.43	+21.20
	Mid	279	211	46.58	35.23	-11.35
	Low	91	32	15.19	5.34	-9.85
3: Comparison of one's own aptitudes or interests with the characteristics of different types of careers	High	211	338	35.23	56.43	+21.20
	Mid	284	228	47.41	38.06	-9.35
	Low	104	33	17.36	5.51	-11.85
4: Analysis of the suitability between the characteristics of different careers and one's own aptitudes or interests	High	225	350	37.56	58.43	+20.87
	Mid	273	224	45.58	37.40	-8.18
	Low	101	25	16.86	4.17	-12.69
5: Identification of goals to develop one's own aptitudes or interests for the desired future career	High	277	392	46.24	65.44	+19.20
	Mid	237	179	39.57	29.88	-9.68
	Low	85	28	14.19	4.67	-9.52

As presented in Table 4, the proportion of students at the high level increased across all indicators after the implementation of the intervention. Indicator 1 (perceiving personal aptitudes and interests) demonstrated the largest increase (+25.04%), followed closely by Indicator 2 (evaluating personal aptitudes and interests) and Indicator 3 (comparing personal aptitudes and interests with career characteristics), which showed identical gains (+21.20% for both indicators). Indicator 4 (analyzing the alignment between career characteristics and personal aptitudes or interests) followed with a gain of +20.87%. Indicator 5 (identifying personal development goals for future careers) recorded the smallest increase in this category, yet still showed substantial growth (+19.20%). Conversely, the proportions of students at the moderate and low levels decreased across all indicators. This shift reflects an upward progression of students from moderate and low levels to the high level after the implementation of lesson plans developed from the prototype.

For the qualitative findings from teacher interviews, the challenges and obstacles encountered in designing and implementing the learning activities according to the prototype can be conceptualized into four primary themes, as follows.

1) Learner Diversity: Given the wide differences in students' aptitudes, interests, and multiple intelligences, activities could not cater equally to all learners. Teachers consequently required considerably more effort in activity design, as one teacher reflected:

> *"Some students are more proficient in writing or speaking, while others prefer utilizing technology. As a result, certain activities could not engage them equitably, making the design process quite challenging."*

2) Time and Resource Constraints: The designed activities often required more time than standard instructional class periods permitted. Compounded by constraints regarding media, equipment, and technological

infrastructure across different schools, certain activities could not be executed to their fullest potential, as reflected by teachers:

> *"Activities require 2–3 hours to complete because students need to explore diverse formats; however, instructional time is insufficient. Furthermore, some activities necessitate specialized spaces, equipment, or specific technologies that schools may lack."*

3) Student Readiness and Mindset: Some students exhibited a lack of self-confidence and remained accustomed to traditional, rote-learning approaches. Teachers thus had to dedicate substantial time to let them get used to the learning activities, as one teacher noted:

> *"Initially, some students lacked the confidence to express their thoughts regarding career interests, requiring a transitional period to adapt."*

4) External Context and Limited Career Exposure: Unanticipated school policies and overlapping extraneous events periodically disrupted instructional continuity. Additionally, primary school students have naturally limited direct exposure to professional careers, demanding substantial time and instructional effort to bridge the gap between personal aptitudes and real-world vocations. One teacher said that:

> *"Primary school learners have relatively limited exposure to professions; thus, bridging their personal aptitudes to the world of work demands considerable time and thorough explanation."*

From the teacher interviews, the teachers also provided recommendations for the prototype in future instructional practices, as detailed in Table 5.

Table 5. Teacher Recommendations for the Prototype

Guideline	Teacher Recommendations
Guideline 1	Teachers should continuously examine data regarding students' aptitudes and preferences to authentically tailor learning activities to individual learner profiles.
Guideline 2	Relying solely on verbal reflection captures insights only from outspoken students. Nonetheless, this practice should be maintained as it cultivates self-reflection and expressive confidence, but it should be paired concurrently with written reflections or structured checklists.
Guideline 3	Teachers must thoroughly research career information, particularly regarding unfamiliar professions, and exercise caution in pedagogical phrasing (e.g., framing suggestions as *"You might consider..."* rather than directive statements like *"I think you should..."*) to foster autonomous decision-making among learners. Additionally, advisory support tools and professional networks should be established.
Guideline 4	Teachers must be well-prepared to address student inquiries comprehensively and should select questions or scenarios that do not induce excessive stress, thereby safeguarding vulnerable student groups.
Guideline 5	Certain activities inherently require students to engage in tasks outside their natural aptitudes, which may lead to fatigue, discouragement, or suboptimal performance. Consequently, teachers must provide more intensive positive reinforcement and affective encouragement during these periods.
Guideline 6	Sufficient instructional time must be allocated. Teachers should consistently habituate students to reciprocal discussions, clearly establish interactive ground rules, and instill the importance of active listening among peers.

5. Discussion

5.1 Development of the Learning Management Prototype

The guidelines embedded within the learning management prototype were derived from design principles synthesized from theories encompassing cognitive, emotional, social, and vocational dimensions. Each principle maintains a distinct instructional focus, ranging from providing opportunities to utilize diverse aptitudes, engaging in reflective practice, and connecting with career information, to authentic problem-solving, positive reinforcement, and social perspective exchange. Crucially, these principles are mutually supportive rather than isolated components addressing single abilities in isolation. This systemic integration serves as an essential condition for fostering comprehensive and sustainable career path discovery among young learners, aligning with Sandoval's (2014) conjecture mapping and learning environment design framework, which posits that instructional elements operate systematically and relationally rather than independently.

5.2 Students' Career Path Discovery Ability Resulting from the Prototype Implementation

The implementation of the prototype yielded positive effects on students' career path discovery ability across all indicators. Indicator 1 (perceiving personal aptitudes and interests) demonstrated the largest increase in the proportion of students achieving the high level. This finding indicates that varied instructional activities effectively stimulate students to explore and recognize their own capabilities. This aligns with Girón-García and Gargallo-Camarillas (2021), who reported that learners' awareness of their learning styles bolsters their engagement and responsibility toward their own learning. Indicators 2 through 4 (evaluating, comparing, and analyzing the alignment between personal aptitudes and career characteristics) showed comparable levels of progression. This suggests that the prototype not only promotes self-awareness but also scaffolds higher-order thinking skills that enable students to analyze relationships between personal attributes and occupational requirements. This outcome is consistent with 21st-century career skill frameworks highlighted by Chaiyama and Kaewpila (2022), who emphasized that critical and analytical thinking skills are pivotal in preparing learners for complex work environments. Although Indicator 5 (identifying personal development goals for future careers) showed the smallest percentage gain among all indicators, this increase remains meaningful. Goal-setting involves a higher level of cognitive complexity, as it requires young learners to bridge current interests with long-term aspirations. This observation supports Greenbank's (2011) argument that significant life and career decisions develop incrementally through accumulated minor choices. Consequently, primary students require sustained scaffolding to systematically align their personal aptitudes with prospective career goals over time. A central insight is that the effectiveness of the prototype relies on the holistic integration of all six principles rather than disjointed execution. Each principle reinforces the others, as mentioned by Sakdapat (2024), who asserted that career skill development demands an integrated framework combining systematic principles, sound policy, and holistic learning experiences.

5.3 Considerations for Implementing the Principles into Instructional Practice

While the prototype was systematically synthesized and empirically validated by experts, actual classroom implementation revealed several contextual factors influencing instructional efficacy. These factors do not signify theoretical flaws in the principles; rather, they reflect the inherent complexity of instructional processes that necessitate readiness across multiple stakeholders. First, perceived value toward career discovery learning presents a notable implementation challenge. This issue may stem not from the conceptual complexity of the principles, but from a lack of perceived value among both teachers and students. In such cases, activities risk becoming superficial routines or compliance-driven tasks completed merely under instruction. This corresponds with Bandura's (1997) social cognitive theory, which posits that perceived outcome value is a critical determinant of human motivation and agency. Instructional design must therefore incorporate observable intermediate milestones throughout tasks, allowing students to recognize tangible value, which fosters intrinsic motivation far more effectively than external compliance (Alt et al., 2022). Second, teachers' capacity to interpret student expressions profoundly affects the accuracy of career alignment. Young students frequently express preferences based on routine exposure or familiar everyday experiences rather than genuine aptitude or intrinsic interest, such as enjoying cooking merely from watching their mother, or aspiring to become a police officer after seeing one on television. This phenomenon reflects Max-Neef's (1991) human scale development framework, which clarifies that expressed satisfiers are context-dependent means of meeting fundamental underlying needs. Teachers must therefore employ targeted probing questions to help students differentiate between mere situational familiarity and genuine interest or aptitude. In conclusion, these two considerations demonstrate that the efficacy of the prototype does not depend solely on the principles themselves. Instead, it hinges upon a shared perception of value between educators and learners, alongside teachers' interpretive pedagogical competence. Both factors represent crucial prerequisites for successfully scaling and adapting this prototype in future educational practices.

6. Implications

The implications offer guidelines for three groups: teachers, school authorities, and curriculum developers.

6.1 Teachers

Teachers play an important role in helping students discover possible career paths through meaningful academic activities. The strong improvement in student performance of all indicators, especially in self-awareness, shows the value of varied and reflective classroom experiences. To achieve this, teachers should apply six key principles in classroom activities. First, learning tasks should align with students' abilities and diverse intelligences. Second, students should be given opportunities to reflect and make their own choices. Third, teachers should provide timely feedback that connects with students' interests. Fourth, classroom activities should incorporate real-life contexts that

allow students to practice problem solving. Fifth, positive reinforcement should be used to build confidence. Sixth, social interaction should be fostered through activities that encourage the exchange of different viewpoints. When these elements are integrated, career exploration can become a sustainable part of primary education.

6.2 School Authorities

For school authorities, the positive outcomes across all indicators highlight the value of adopting and supporting learning management prototypes that integrate career awareness into primary education. School administrators should consider providing institutional support, such as allocating time within the school schedule for career-related learning activities and encouraging cross-subject integration of career exploration themes. Furthermore, authorities should invest in professional development programs that equip teachers with the skills to effectively implement learning management principles focused on career discovery. Sustained administrative support, access to resources, and persistent oversight of execution are essential to ensure consistent and long-term benefits for primary students, as the preparation of teachers for the delivery of activities to enhance the ability of students to discover career paths requires significant time and effort during instruction sessions.

6.3 Curriculum Developers

Curriculum developers may consider designing two complementary curricula. The first curriculum should focus on primary school students and include learning experiences that help students explore and recognize possible career paths from an early age. The second curriculum should focus on teachers (teacher training sessions) that aim to strengthen their ability to create learning environments that support career path discovery. In addition, curriculum frameworks should systematically integrate career path discovery into the core structure of primary education. Curriculum developers are encouraged to embed six key principles of learning management that support students' ability to explore potential careers. These principles should guide the design of learning activities, classroom interaction, and assessment. Relevant and engaging activities that encourage reflection, exploration of interests, problem solving, and social interaction should be clearly included as essential elements of the curriculum.

7. Conclusion

This study presented a learning management prototype aimed at fostering primary school students' career discovery ability. The prototype supported students' career discovery ability across all five indicators, with a marked increase in the proportion of students achieving high level in every indicator. The findings demonstrate that primary school students have the potential to explore their identities and reflect meaningfully on future careers when provided with appropriate learning experiences. Ultimately, this research underscores the vital importance of systematic, experiential career education at the primary level, offering a valuable framework for teachers, educational institutions, and curriculum developers seeking to cultivate career awareness, self-understanding, and future readiness in young learners. Despite these promising outcomes, several methodological limitations should be considered when interpreting the findings. First, the single-group pretest–posttest design lacked an equivalent control group, which limits the ability to isolate the prototype as the sole causal mechanism behind the observed gains. Second, the reliance on student self-report assessments introduces the possibility of perceptual subjectivity and self-assessment bias. Third, the prototype was conducted over a relatively short instructional period without longitudinal follow-up, leaving the long-term effects of this newly acquired ability undetermined. Consequently, future research should incorporate comparative control group designs, multi-source evaluation metrics, and longitudinal tracking to more robustly validate the prototype's enduring efficacy.

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Appendix A

Self-Evaluation Form of Ability to Discover Career Paths for Primary School Students

No.	Statement	This is truly me	This is me to some extent	This is not me
1	I can say whether I like or dislike the activities or tasks done in the classroom.			
2	I can state what I did well from past classroom activities or tasks.			
3	I can describe in detail what I did well in classroom activities or tasks.			
4	I can explain the reasons why I like certain classroom activities or tasks.			
5	I can express the level of enjoyment in classroom activities or tasks.			
6	I can name my top three favorite or best-done classroom activities or tasks.			
7	If the teacher invites me to do several classroom activities, I can say which one I liked or did best.			
8	After completing classroom activities or tasks, I can state how I should develop myself further.			
9	When thinking of my dream career, I know what aspects of myself I need to consider.			
10	I can identify which careers match what I like or do well.			
11	I can state what is required to do in each career.			
12	If I like drawing, I can say which careers it matches.			
13	If I have to choose my dream career, I can explain why it is suitable for me.			
14	If I dislike something about a career, I will place it near the bottom of my dream career list.			
15	If I hear the job descriptions for various careers, I can say if I would be able to do them.			
16	If someone suggests a career for me, I can say whether it matches me or not.			

No.	Statement	This is truly me	This is me to some extent	This is not me
17	If I know my dream career, I know what I need to develop in myself.			
18	If there is something I like but am not good at yet, I will practice it more.			
19	I like to ask teachers or do my own research on what I need to improve for my dream career.			
20	If I encounter an activity I like or do well that matches my dream career, I will do my best.			

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