

Examining Influential Factors on The Success of Project Management In Education: A Content Analysis

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There has been an amplified demand for project management skills in the workforce and with the ever-evolving technology; the importance of project management in education has become increasingly evident. Project management is a complex discipline, and educators know that every project is assigned limited resources, but they must identify and define the critical path to success. Based on contingency theory, the Technology Acceptance Model (TAM), and Agile methodology, this study investigated the key project management principles that contributed to the success of project management cases in education indicated by its value. Quantitative content analysis was conducted on 104 project management cases published in peer-reviewed journals between 2010 and April 2025. Logistic regression and chi-square analyses were performed to examine 12 project management principles and results showed that five were significant predictors of the success of a project.

Keywords: Project Management in education, AI, Project Management principles, Contingency theory, Agile theory, TAM.

INTRODUCTION

Project management (PM) is the discipline of utilizing specific knowledge, methodologies, tools, and techniques to project activities to achieve specific project goals and measurable project outcomes, including successful project completion (Donato & Greenberg, 2025). In today's global and technological workforce, project management stands out as a crucial skill needed by students and educators (Even, 2024). Incorporating PM principles improves the delivery and impact of educational programs and activities, improving teaching and the effectiveness of learning. Educators have faced the challenge of managing complex projects with numerous stakeholders, resources, and deadlines, so adding one more thing to the educator's job requirement is quite a stretch. However, PM methods can serve as tools for educators and students to navigate their projectized settings.

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Effective PM can ensure the success of educational programs, optimize resources, minimize risks, and prepare students for the workforce (Even, 2024). PM tools facilitate communication and collaboration (Ginevri & Trilling, 2018), and educators desire to have effective communication and sometimes collaboration that has value. PM includes a variety of processes, practices, methods, and frameworks traditionally used to ensure project success through planning, executing, monitoring, and controlling (PMI, 2017).

A project is defined by the Project Management Institute (PMI) as a temporary endeavor, aiming to create a unique result, enabling the creation of quantifiable benefit and initiated by leaders of an organization (PMI, 2017). Examples of projects can be development of a video game, building construction, or campaigns for a cause. Every project moves through a project life cycle, which is a basic framework that project managers and teams use to effectively structure projects and set them up for success (PMBOK® GUIDE, 2021, p. 4).

In recent years, the application of project management principles in education has gained significant attention, driven by advancements in digital technology and the increasing demand for project management competencies in the modern workforce. Project management provides a structured approach to navigating challenges, enabling institutions to align goals, manage resources efficiently, and ensure measurable outcomes (Burke, 2013 p.239). Integrating PM principles and methodologies into the educational sector significantly enhances teaching, learning, and the student experience (Even, 2024).

While project management principles provide a framework for achieving organizational efficiency, their application often yields mixed outcomes depending on how they are contextualized and implemented. Principles such as stakeholder engagement, systems thinking, and leadership tend to enhance collaboration, innovation, and alignment with institutional goals, thereby increasing the likelihood of project success (PMI, 2021; Too & Weaver, 2014). Likewise, inadequate tailoring of these principles, poor risk management, or limited adaptability to changing environments can hinder progress and reduce project value (Joslin & Müller, 2016; Serrador & Pinto, 2015). In the educational context, where projects are influenced by diverse human, technological, and policy factors, understanding which principles drive successful outcomes becomes critical. Therefore, this study examines the effects of project management principles on project success, as indicated by the project's value, to determine which factors contribute most significantly to positive results and which may present challenges.

LITERATURE REVIEW

This section reviews the evolution of project management in education, including literature review on gamification in PM in education, and the role of AI in PM. This is followed by the description of some generative AI tools in PM. Next, the project management principles were defined. The section then delves into the theoretical and conceptual framework of this study. Finally, the focus of the study is outlined, detailing the key research question guiding the investigation.

THE EVOLUTION OF PROJECT MANAGEMENT EDUCATION

Historically, project management education focused heavily on theoretical instruction and standardized methodologies, often based on frameworks such as PMI's PMBOK and PRINCE2 (Wilson, 2022). However, there has been a shift towards experiential learning approaches that integrate practical application, leadership training, and competency development (Ewin et al., 2017). Similarly, Shelley (2015) advocates for structuring project management education as projects, incorporating milestones and reflective learning to

enhance student engagement and competency development. Ewin et al. (2017) advocates for design thinking as a novel approach, arguing that traditional methods fail to prepare students for real-world complexities.

The importance of project management education is growing steadily (Kostalova & Bednarikova, 2017). (Ramazani & Jergeas, 2015) recommended seeing project management education as a multidimensional and complex process. Several studies have investigated the impact of PM education on students' learning outcomes and subsequent job performance (Austin et al., 2013). It is a skill in high demand in today's workforce, and it is becoming increasingly important for students to develop these skills for success (Nieto-Rodriguez, 2019). PM education has become an essential part of many educational programs, as it has proven effective in improving students' problem-solving, decision-making, and communication (Even, 2024). Numerous studies have examined the impact of PM education on students' skills, and they agree that project-based learning significantly enhances students' problem-solving skills, particularly in civil engineering and construction management, through structured role-playing and project execution planning (Zhang et al., 2019). Moreover, one meta-analysis indicates that project-based learning substantially improves students' learning outcomes, academic achievement, and critical thinking abilities (Zhang & Ma, 2023).

The shift toward digital learning platforms has reshaped project management education, particularly in response to the COVID-19 pandemic. Shen et al. (2023) analyzed the use of digital collaboration tools such as Zoom, Microsoft Teams, and Blackboard Collaborate Ultra, finding that these platforms increase accessibility and flexibility for students and educators. Project management is also integrated into pedagogy itself. Project-Based Learning (PBL) engages students in managing real-world projects, requiring them to set goals, divide tasks, meet deadlines, and evaluate results. Educators serve as facilitators, helping students build both subject knowledge and 21st-century skills such as collaboration and critical thinking (Bell, 2010).

PM is evolving and is no longer a practice specific to the internet technology (IT) or construction industries. PM has become a valuable and widely used process in post-pandemic human resource management and the education industries. The popularity of the PM has grown in the economic sector also. The economy is becoming increasingly project-based, and some businesses have begun to use the term “project economy” to describe this shift. Therefore, students must acquire PM skills to thrive in a project-driven economy (Ginevri & Trilling, 2018). Project management education is usually included in study plans at both economic and technical faculties of universities (Kostalova et.al, 2018). The lessons are usually designed in accordance with one of the International Project management Standards and focus on both technical skills and soft skills (Pant & Baroudi, 2008).

Simulation-based training (SBT) has also gained traction as a pedagogical tool in project management education. Shtub et al. (2013) conducted an experimental study to assess SBT's impact on learning outcomes. Their findings suggest that while SBT enhances declarative knowledge and engagement, its effectiveness depends on trainees' prior knowledge and attitude toward the method. These insights underscore the necessity for adaptive and context-specific educational interventions. With the change from emphasizing what competence project managers should have, to principles they should abide by, there is a growing responsibility in place for educators who already believe project management is a complex discipline.

In the radical change from PMI, the sixth edition of the PMBOK highlighted 10 project management knowledge areas. These are the core aspects of running a project and it provides the processes needed to manage a project successfully, and also provides frameworks to help project managers' plan, manage and finalize projects. The 10 knowledge areas are: project integration management, scope management, schedule, cost, quality,

resources, communications, risk, procurement and stakeholder. As the process of PM evolves, the 7th edition shifted from the detailed project management process framework into foundational principles and domains that help project managers to utilize the agile framework in order to be innovative and create customer satisfaction. The 7th edition performance domains emphasize performance in all domains with the goal of delivering value. The 6th edition process framework focuses on doing the right processes in the correct order (PMI, 2021).

The significance of this study lies in its potential to improve project management practices by offering empirical evidence on how various PM principles and AI tools influence project outcomes.

In the educational settings, there are multiple and diverse stakeholders including the administration, faculty, students, goals of the institution and the department and constraints within the institution including funding cycles, culture and policies

ARTIFICIAL INTELLIGENCE AND GENERATIVE AI AS ENABLERS OF PROJECT MANAGEMENT PRINCIPLES

Artificial intelligence (AI) is transforming the landscape of project management by introducing advanced automation, predictive analytics, and data-driven decision support. Studies have shown that AI enhances efficiency across all phases of project implementation— from planning and execution to monitoring and evaluation—by providing real-time insights and improving accuracy in forecasting outcomes (Wamba-Taguimdje et al., 2020; Khosrojerdi et al., 2021). In the context of education, AI-based tools help optimize learning projects, streamline administrative decisions, and personalize experiences for learners (Alyoussef, 2021; Cheng, 2019; Cope et al., 2020). According to Grandview Research (2022), the global AI in education market was valued at USD 2.75 billion in 2022 and is projected to reach USD 32.27 billion by 2030, reflecting the growing integration of AI technologies across sectors. AI, defined as “a system’s ability to interpret external data correctly, to learn from such data, and to use those learnings to achieve specific goals and tasks through flexible adaptation” (Kaplan & Haenlein, 2019, p. 17), has become a strategic driver of innovation and organizational adaptability.

Within project management, AI capabilities are increasingly aligned with the twelve Project Management Institute (PMI) principles described in the *PMBOK Guide* (7th ed.). For instance, predictive analytics strengthen the Risk principle by identifying potential threats and opportunities early, enabling timely mitigation strategies (Aladag, 2023; Kamari & Ham, 2021). Similarly, natural language processing and automation tools enhance Stakeholder communication by summarizing reports, tracking feedback, and maintaining consistent information flow (Wamba-Taguimdje et al., 2020). Machine learning algorithms contribute to Quality management by detecting deviations in project performance and generating improvement recommendations (Adegbite et al., 2023). AI-driven dashboards assist with Complexity and Systems Thinking, allowing project managers to visualize interdependencies and adapt strategies in dynamic environments. Moreover, adaptive and generative AI tools embody Tailoring, Adaptability, and Resiliency principles by supporting iterative project design and facilitating quick recovery from disruptions. Collectively, these applications illustrate that AI functions not merely as a technological addition but as a mechanism that operationalizes and strengthens the PMI principles to achieve project success.

Generative AI, in particular, has expanded the potential of project management through its capacity to create content, simulate scenarios, and automate documentation. Emerging prominently in 2023, tools such as ChatGPT, Microsoft Copilot, and PMI Infinity are reshaping how projects are planned, monitored, and communicated (Dwivedi et al., 2023; Dougherty, 2024; Microsoft, 2023). ChatGPT supports Leadership and Change principles

by assisting with idea generation, stakeholder updates, and training materials, while Microsoft Copilot enhances Stewardship and Team collaboration through automatic report generation and shared task management. PMI Infinity, developed by the Project Management Institute, integrates organizational knowledge and best practices to guide decision-making aligned with ethical and professional standards (Dougherty, 2024). Despite growing adoption, the 2023 PMI Annual Global Survey on Project Management revealed that only 21 percent of respondents regularly use AI tools, even though 82 percent of senior leaders believe AI will significantly affect future projects (Dougherty, 2024). This gap underscores the need for further empirical research on how AI integration supports adherence to the PM principles in education and other domains.

Overall, AI and generative AI tools enhance efficiency, collaboration, and adaptability across multiple project management domains. Their integration aligns directly with value-driven project delivery emphasized in the *PMBOK Guide* (2021). By enabling predictive decision-making, promoting transparency, and automating repetitive processes, AI strengthens the theoretical and practical connection between technological innovation and the foundational principles of project management. This connection provides the conceptual basis for examining how AI, alongside the twelve PM principles, contributes to project success in this study.

This study draws on established theoretical perspectives to explain how project management practices contribute to variations in project success. Contingency Theory posits that effective management depends on alignment between practices and situational conditions, emphasizing adaptability to organizational and environmental contexts (Burns & Stalker, 1961; Lawrence & Lorsch, 1967). The Technology Acceptance Model (TAM) highlights the role of perceived usefulness and ease of use in shaping the adoption and effective application of project practices and tools (Davis, 1989). Complementing these views, Agile Project Management Theory underscores flexibility, iteration, and continuous learning as essential for managing uncertainty and complexity (Hanisch & Wald, 2012; PMI, 2021). Together, these frameworks provide a rigorous and integrated lens for examining how project management principles interact to influence value-based project outcomes.

THEORETICAL FRAMEWORK

In recent years, the application of project management principles in education has gained significant attention, driven by advancements in digital technology and the increasing demand for project management competencies in the modern workforce. Frameworks such as predictive (Waterfall) and adaptive (Agile) methodologies have shaped how institutions approach innovation, efficiency, and measurable impact (PMBOK® Guide, 2021). The predictive model, commonly referred to as the Waterfall approach, emphasizes a structured, sequential process in which each project phase must be completed before the next begins. While this approach works well for projects with clearly defined requirements, it often lacks flexibility when dealing with dynamic or uncertain environments, necessitating alternative frameworks that prioritize adaptability and responsiveness (PMI, 2021).

To analyze the influence of project management principles and the use of artificial intelligence (AI) on project success, this study draws upon three theoretical foundations: Contingency Theory, the Technology Acceptance Model (TAM), and Agile Project Management Theory. Contingency Theory posits that there is no single best way to manage projects; success depends on the alignment between internal processes and external contextual factors (Burns & Stalker, 1961; Lawrence & Lorsch, 1967; Grottsch et al., 2013). This theory supports the understanding that project management principles operate differently across contexts, reinforcing the need for adaptability and situational awareness

concepts that align closely with Agile methodology, which emphasizes iterative progress and continuous improvement (Hanisch & Wald, 2012).

The Technology Acceptance Model (TAM) further complements this framework by explaining how users accept and adopt new technologies, such as AI tools, based on their perceived usefulness and ease of use (Davis, 1989; Martin, 2022). In educational and organizational settings, the affective and behavioral responses to technology significantly influence adoption, integration, and eventual project outcomes (Kramarski & Michalsky, 2010; Huang et al., 2007). Together, these theories provide a multidimensional foundation for understanding how project management principles, combined with emerging technologies like AI, contribute to project success. Therefore, the purpose of this study is to examine the effects of project management principles and AI tools on project success, as indicated by project value.

THE FOCUS OF THE PRESENT STUDY

The purpose of this study was to investigate the relationship between various project management (PM) principles, AI tools and the predictability of the success of a project. It aimed to identify the influential factors of project management on the value of the project which is an indicator of success and examine the extent to which these influential factors contribute to their success.

Based on the purpose of the study, a Correlational research design approach was utilized to determine if project management principles used could predict whether the project was successful or not. Correlational research is a type of non-experimental research that examines the statistical relationship between two or more variables without manipulating them (Price et al., 2017). Figure 1 shows all the principles of project management.



Figure 1. *The Project Management Principles (PMBOK, 7th Edition)*

1. **Stewardship:** Stewards is about the ability to manage resources efficiently; it encompasses responsibilities within and external to the organization. It includes Integrity, care, trustworthiness, and compliance. A holistic view of stewardship considers financial, social, technical, and sustainable environmental awareness (PMI, 2021).

2. **Team:** Project teams are made up of individuals who wield diverse skills, knowledge, and experience. Project teams that work collaboratively can accomplish a shared objective more effectively and efficiently than individuals working on their own (PMI, 2021).

3. **Stakeholders:** this implies the ability to engage stakeholders proactively and to the degree needed to contribute to project success and customer satisfaction. Stakeholders influence projects, performance, and outcomes.

4. **Value:** Value is the ultimate indicator of project success. Project Manager strives to continually evaluate and adjust project alignment to business objectives and intended benefits and value. Value can be realized throughout the project, at the end of the project, or after the project is complete (PMI, 2021). Value in this study is used as the response variable.

5. **Systems Thinking:** Systems thinking entails taking a holistic view of how project parts interact with each other and with external systems. Since systems are constantly changing, requiring consistent attention to the internal and external conditions, being responsive to system interactions allows project teams to leverage positive outcomes (PMI, 2021).

6. **Leadership:** Any project team member can demonstrate leadership behaviors and leadership is different from authority. Being able to demonstrate and adapt leadership behaviors to support individual and team needs is a principle any project manager should work with. Leaders demonstrate desired behavior in areas of honesty, integrity, and ethical conduct (PMI, 2021).

7. **Tailoring:** Each project is unique, so a project manager should be able to design the project development approach based on the context of the project, its objectives, stakeholders, governance, and the environment using “just enough” process to achieve the desired outcome while maximizing value, managing cost, and enhancing speed. Tailoring the approach is iterative, and therefore is a continuous process throughout the project (PMI, 2021)

8. **Quality:** Project quality entails satisfying stakeholders’ expectations and fulfilling project and product requirements. It also entails ensuring project processes are appropriate and as effective as possible.

9. **Complexity:** this is the result of human behavior, system interactions, uncertainty, and ambiguity. It can emerge at any point during the project; it can be introduced by events or conditions that affect value, scope, communications, stakeholders, risk, and technological innovation. Project teams can stay vigilant in identifying elements of complexity and use a variety of methods to reduce the amount or impact of complexity (PMI, 2021).

10. **Risk:** Risks can be positive (opportunities) or negative (threats), and they need to be addressed continually throughout the project. A successful project will have risk responses in place before the project starts (PMI, 2021). Risk responses ought to be:

- a. Appropriate for the significance of the risk,
- b. Cost effective,
- c. Realistic within the project context,
- d. Agreed to by relevant stakeholders, and
- e. Owned by a responsible person

11. **Adaptability and Resiliency:** Adaptability is the ability to respond to changing conditions while resiliency is the ability to absorb impacts and to recover quickly from a setback or failure. Building adaptability and resiliency into the organization’s and project

team's approaches to help the project accommodate change, recover from setbacks, and advance the work of the project (PMI, 2021).

12. **Change:** A structured approach to change helps individuals, groups, and the organization transition from the current state to a future desired state. Change can originate from internal influences or external sources. Enabling change can be challenging as not all stakeholders embrace change. Stakeholder engagement and motivational approaches assist in change adoption.

RESEARCH QUESTION

Based on the purpose of the study, the following two research questions were used to guide through the study:

1. Can the probability that a project is successful indicated by its value, be predicted by the use of any of the other eleven Project management principles: Stakeholders (SH), Team (TE), Stewardship (SW), Systems Thinking (ST), Leadership (LD), Tailoring (TL), Quality (QC), Complexity (CL), Adaptability and Resiliency (AR), Risk (R) Change (C), and use of AI (AI)? If yes, to what extent do the significant predictor(s) influence such probability?
2. Are there significant differences in the proportions between successful and unsuccessful Project management in education cases in relation to the presence and absence of certain Project management principles?

METHODOLOGY

A quantitative content analysis method was adopted in this study, using published studies in the literature as the sample, where each study was treated as an individual case. Data coding and analysis was conducted on those "cases." Content analysis is "a research technique for the objective, systematic and quantitative description of the manifest content of communication" (Berelson, 1952, p. 18, as cited in Liu, 2022). Content analysis can be used qualitatively or quantitatively for analyzing content systematically. The content (i.e., source data) is qualitative and can be in various formats, such as texts, drawings, photographs, audio recording, videos, etc. (Liu, 2022). Although qualitative content analysis makes inferences by categorizing the source data and analyzing the themes, quantitative content analysis records and quantifies qualitative source data and uses statistical methods for hypothesis testing.

SAMPLING

The sample of this study contained 104 articles published between 2010 and April 2025 in peer-reviewed journals. The sample selection criteria and procedures are as follows.

Inclusion criteria

1. Article must be a peer-reviewed journal article, published in English and published between 2010 and 2025.
2. The studies used at least three of the principles of project management as described in the data coding section.
3. Studies integrate AI technologies explicitly in the context of project design, implementation, and evaluation.
4. Both empirical studies (qualitative, quantitative, and mixed methods) and theoretical studies were considered.

Exclusion criteria

1. Non-peer-reviewed articles
2. Publications before 2010

3. Studies not directly related to the integration of PM in education.

Screening Procedures

This screening process was conducted in two phases. The first phase involved screening through the titles and abstracts of the publications. In the cases where the information of the above criteria is unavailable in the abstracts, a scan of the methodology section was needed to determine the inclusion or exclusion of the publications. Publications without the full text and the ones who did not fit the context of education were excluded also. This phase yielded 198 articles for the full text screening phase.

In the full text screening phase, using the four inclusion criteria detailed above, the researcher thoroughly reviewed the remaining coding and extraction of information. This phase resulted in 104 publications, which was the final sample of the study.

CODING

Coding of the Response Variable. The response variable is project success in the study ultimately determined by the value, if the researcher described the PM outcome as expected, it can be considered a successful case, and therefore it will be coded as 1. A case will be coded as successful if the article explicitly states that the project

- Met its planned goals /outcomes. For example, in the article by (Calavia et al., 2022), the study introduced a design thinking-based board to see if it could improve the implementation and management design projects. The board was perceived as helpful in developing design projects and improving collaborative learning. It was beneficial for the management, monitoring, and communication, enriching the project process and outcomes. This project is an example of a study that met its outcomes.
- was completed on time and within budget,
- Received positive evaluation or stakeholder satisfaction, or
- The value of the project was explicitly indicated as successful.

If the outcome of the PM did not achieve the expected response described by the researcher, it will be considered unsuccessful and coded as 0.

Coding of the Explanatory (Predictor) Variables

Table 1 provides the codebook with the inclusion and exclusion criteria that were used in data analysis.

Table 1. Variable Coding Criteria

Variable	Definition	Inclusion Criteria (Code 1)	Exclusion Criteria (Code 0)
Stakeholders (SH)	Evidence that stakeholder input was actively gathered, leading to buy-in or improved outcomes, and active support/feedback improved project relevance, educational outcomes, or timely implementation.	<ul style="list-style-type: none"> · Stakeholder feedback directly influenced project design or implementation. · Evidence of active engagement (meetings, surveys, workshops) that shaped outcomes. · Stakeholder involvement resulted in improved project relevance or speed. · Clear documentation of buy-in. 	<ul style="list-style-type: none"> · Stakeholder mention without active engagement. · Passive consultation with no impact on the project. · Lack of involvement of stakeholders. · Outcomes unrelated to stakeholder input.
Team (TE)	Collaborative teamwork was critical	<ul style="list-style-type: none"> · Roles clearly defined and understood. 	<ul style="list-style-type: none"> · Generic “team effort” statements.

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	to delivering project results, with clear roles, communication, or cross-team collaboration leading to innovation or improved workflows.	Collaboration across teams produced innovative solutions. Communication and role division led to streamlined implementation. Multiple teams worked together to achieve shared goals.	<ul style="list-style-type: none"> · No description of role clarity or collaboration. · Independent work without interaction. · Teamwork not linked to results.
Stewardship (SW)	Ethical responsibility in resource allocation and decision-making transparency, prioritizing student learning, ethical data use, and accountability.	<ul style="list-style-type: none"> · Evidence of transparent decision-making. · Ethical use of student data. · Resources allocated based on fairness and student benefit. · Accountability for outcomes explicitly demonstrated. 	<ul style="list-style-type: none"> · No discussion of ethics or transparency. · Misallocation or unethical practices. · Responsibility for outcomes unclear.
Systems Thinking (ST)	Adjustments made in one area to improve performance across the system, considering how changes affect broader institutional or school-wide systems.	<ul style="list-style-type: none"> · Intentional changes designed for system-wide improvement. · Consideration of ripple effects on other departments/systems. · Integration of feedback loops. · Awareness of interdependencies (e.g., curriculum to assessment). · Long-term integration into institutional processes. 	<ul style="list-style-type: none"> · The effects happened by accident. · Only local/isolated changes with no system view. · Mention of “system” without describing connections. · No evidence of cross-department or institutional awareness.
Leadership (LD)	Leadership responsiveness and strategic decision-making enabled progress despite challenges, providing vision, direction, and motivation.	<ul style="list-style-type: none"> · Leadership resolved conflicts or resistance. · Strategic choices kept the project on track. · Leaders provided clear direction. · Leaders motivated and aligned teams. 	<ul style="list-style-type: none"> · Leadership mentioned but not linked to success. · Passive or symbolic leadership roles. · Leadership not involved in critical decisions. · No evidence of leader influence.
Tailoring (TL)	Project management methods, tools, or instructional strategies were customized to context, improving efficiency or quality.	<ul style="list-style-type: none"> · Adaptation of methods to size, scope, or needs. · Simplified tools/processes improved efficiency. · Strategies/tools are modified for learner or classroom needs. · Lesson delivery adjusted based on data. 	<ul style="list-style-type: none"> · Generic or unmodified solutions. · Trivial adjustments unrelated to outcomes. · “Tailored” claimed without evidence. · One-off changes without lasting effect.

		<ul style="list-style-type: none"> · Iterative refinements from stakeholder feedback. · Solutions custom-built for context of the study. 	
Quality (QC)	Deliverables met or exceeded defined quality standards, maintained satisfaction, or used continuous feedback to refine outputs.	<ul style="list-style-type: none"> · Deliverables met curriculum or quality standards. · High end-user satisfaction documented. · Continuous monitoring led to improvements. · Feedback loops refined materials. 	<ul style="list-style-type: none"> · No quality standards mentioned. · Poor satisfaction levels. · Standards unclear or missing.
Complexity (CL)	The project progressed despite high uncertainty, multiple interdependencies, or diverse needs, effectively managing complex situations.	<ul style="list-style-type: none"> · Managed uncertain or rapidly changing conditions. · Integrated diverse learner needs or subjects. · Managed multiple stakeholders/admin layers. · Used tools to visualize or map complexity. 	<ul style="list-style-type: none"> · Simple projects without complexity. · Complexity present but unmanaged. · Mention of “complex” without details. · No tools or processes to manage complexity.
Adaptability & Resiliency (AR)	Team responded effectively to unexpected challenges, revising scope or approach without losing core goals.	<ul style="list-style-type: none"> · Flexible responses to challenges. · Scope revised while maintaining goals. · Adjustments made under pressure. · Evidence of recovery from setbacks. 	<ul style="list-style-type: none"> · Rigid approach despite challenges. · Changes derailed goals. · Adaptations not linked to outcomes. · No challenges addressed.
Risk (R)	Risks were identified, documented, and influenced decision-making/resource allocation; contingency plans activated as needed.	<ul style="list-style-type: none"> · Risk analysis conducted. · Risks documented and tracked. · Contingency plans implemented. · Risk awareness shaped decisions. 	<ul style="list-style-type: none"> · No risk identification. · Risks ignored or poorly managed. · Contingency plans absent. · Risks mentioned but not acted upon.
Change (C)	Meaningful and sustained change was introduced and integrated into practice.	<ul style="list-style-type: none"> · Change produced significant impact. · Sustained beyond project duration. · Integrated into normal operations. · Evidence of transformation. 	<ul style="list-style-type: none"> · Short-term or superficial change. · No evidence of integration or minimal impact.
Use of AI (AI)	Generative AI or other AI tools were used for analysis, prediction, or project delivery.	<ul style="list-style-type: none"> · AI tool used for prediction, automation, or content creation. · AI informed decision-making. · Evidence of AI application in study context. 	<ul style="list-style-type: none"> · No AI use mentioned. · Only general tech use without AI. · Tool not AI-based.

INTERRATER RELIABILITY ANALYSIS

For the coding in this content analysis, an interrater reliability test was conducted. Interrater reliability is defined as the extent to which two or more coders reach agreement on the coding decisions, while intra-rater reliability is defined as the extent to which one coder agrees with himself/herself over time (Rourke et al., 2001). In most literature, 15% of the total number of data can be considered appropriate for the interrater/intrater reliability check (Landis & Koch, 1977). This study used 28.8% (30 articles) of the total amount of data, for the interrater reliability analysis. Cohen's Kappa was used to determine the agreement of the coding results for the variables between the coding results at the two different times (Cohen, 1960).

Thirty articles were randomly selected from the 104 articles for the second rater to recode data. To decide if the second coding for the interrater reliability analysis meets certain criteria, the coder is expected to be qualified in terms of expertise, research area, and experiences (Liu, 2022). The second coder for this study was a scholar who had been working and conducting research in the field of instructional design and quantitative methods of data analysis for about ten years. The second coder followed the same criteria of data coding as the first coder used and re-coded the 30 randomly selected articles.

The interrater reliability analysis was conducted using Cohen's Kappa to determine the agreement of the coding results for the variables between the two coders (Cohen, 1960). Table 2 shows the results of interrater reliabilities between the two coders on all variables. A value of Kappa between .40 and .59 is considered moderate, between .60 and .79 is considered substantial, and above .80 is considered outstanding (Landis & Koch, 1977). Based on this, the levels of agreement between the two coders on the variables can be considered good as the Kappa coefficients ranged from 0.432 to 0.933 and all were significant ($p < .05$). The data from the first coder – the researcher was used for data analysis.

Table 2. Levels of Agreement between two raters (N=30)

Variable	Kappa Coefficient	P-value
Value as indicator of success (VL)	0.831	< .001
Stakeholders (SH)	0.432	0.020
Team (TE)	0.722	< .001
Stewardship (SW)	0.667	< .001
Risk (R)	0.866	< .001
System Thinking (ST)	0.795	< .001
Leadership (LD)	0.724	< .001
Tailoring (TL)	0.615	< .001
Quality (QC)	0.583	< .001
Complexity (CL)	0.851	< .001
Adaptability & Resiliency (AR)	0.800	< .001
Change (C)	0.933	< .001
AI tools (AI)	0.932	< .001

DATA ANALYSIS AND RESULTS

This section presents the data analysis and findings based on the research questions that guided the study. Each research question is addressed through the appropriate statistical techniques, and the results are organized to highlight significant patterns, relationships, and predictors of project success.

DATA ANALYSIS AND RESULTS FOR RESEARCH QUESTION 1

Q1: Can the probability that a Project is successful (as described by the author of the case) indicated by the value, be predicted by the use of any of the other eleven Project management principles: Stakeholders (SH), Team (TE), Stewardship (SW), Systems Thinking (ST), Leadership(LD), Tailoring (TL), Quality (QC), Complexity (CL), Adaptability and Resiliency (AR), Risk (R) Change (C), and use of AI tools (AI)? If yes, to what extent do the significant predictor(s) influence such probability?

LOGISTIC REGRESSION. For research question 1, logistic regression was utilized for data analysis. Logistic regression is basically an extension of multiple regression in situations where the response variable is not a continuous or quantitative variable (George & Mallery, 2000). Logistic regression analysis produces a regression equation, the logit model, that predicts the probability of whether an individual will fall into one category (e.g., pass) or the other (e.g., fail) (Tate, 1992). The goal of logistic regression analysis is to correctly predict the category of outcome for individual cases. The logit model is expressed below (Mertler& Reinhart, 2017):

$$\text{Logit}(\hat{p}) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k \dots + \varepsilon \dots \quad (\text{Equation 1})$$

In the left side of the equation, the sign (\hat{p}) indicates an estimated probability value (also called log odds) for the response variable to be 1, and logit represents logit transformation of the event probability. The response variable is coded into binary data (for example, successful = 1, unsuccessful = 0). On the right side of the equation, X_1 to X_k are the explanatory variables, β_1 to β_k are the coefficients for the explanatory variables respectively, β_0 is the intercept, and ε is the error term of the model.

In this study, the response variable was *Value* of the project which depicts the success, and the rest of the 11 project management principles with AI tools were the explanatory variables.

DATA ANALYSIS PROCEDURES. In the logistic regression analysis, the following procedures were performed:

Step 1. generated the initial logistic regression model (Equation 1) using all 12 explanatory variables, and to examine if the model is significant, and how many/which explanatory variables are significantly contributing to the model,

Step 2. used different combinations of the explanatory variables to generate different models and examine each model again, and

Step 3. selected a model that best fits the data and explains how/why they can be used to predict the probability of a project management case to be successful, that is, the PM case produces expected outcomes.

RESULT FOR THE LOGISTIC MODEL. When all variables were used for the logistic regression, the model summary results showed that the model was significant ($\chi^2_{(12)} = 82.404$, $p = <.001$), indicating that the model with predictors provided a significantly better fit than the null model (intercept-only) and accounted for 77.5% of the variation in the response variable ((Nagelkerke $R^2 = 0.775$). A total of 89.3% were correctly predicted by the model. Table3 below shows the result of the logistic regression.

Table 3. Result of Logistic Regression

	DF	Parameter Estimate	Standard Error	Wald Chi-Square	P	Odd Ratio
Stakeholders (SH)	1	36.732	14960.013	0.000	0.998	8.963E+15
Team (TE)	1	0.493	1.149	0.184	0.668	0.611
Stewardship (SW)	1	0.204	0.868	0.055	0.814	0.815
Systems Thinking (ST)	1	3.160	1.186	7.097	0.008	23.570
Leadership (LD)	1	3.142	1.286	5.973	0.015	23.162
Tailoring (TL)	1	0.573	0.976	0.345	0.557	1.773
Quality (QC)	1	2.369	1.056	5.038	0.025	10.690
Complexity (CL)	1	2.377	1.113	4.558	0.033	10.775
Adaptability & Resiliency (AR)	1	0.728	0.868	0.702	0.402	2.070
Risk (R)	1	-2.034	0.958	4.510	0.034	0.131
Change (C)	1	0.825	1.024	0.650	0.420	2.283
AI tools (AI)	1	1.029	1.283	0.644	0.422	2.800
Constant	1	-16.049	10250.87	0.000	0.999	0.000

Next, a model with five significant explanatory variables (Table 4) was examined.

Table 4. Significant Variables from Logistic Regression

Explanatory Variables	Wald Chi-Square	Significance
Systems Thinking	7.097	0.008
Leadership	5.973	0.015
Quality	5.038	0.025
Complexity	4.558	0.033
Risk	4.510	0.034

Model summary results showed that the model with the five significant explanatory variables was significant ($\chi^2 = 60.915, p = <.001$) and accounted for 62.5% of the variation in the response variable (Nagelkerke $R^2 = 0.625$). A total of 84.6% were correctly predicted by the model. The significant variables were re-ran. The results are presented in Table 5.

Table 5. Logistic Regression Output

	D	Parameter	Standard	Wald Chi-	P	Odds
	F	Estimate	Error	Square		Ratio
Systems Thinking (ST)	1	2.432	0.758	10.295	0.001	11.385
Leadership (LD)	1	2.703	0.695	15.122	< 0.001	14.918
Quality (QC)	1	1.484	0.737	4.051	0.044	4.409
Complexity (CL)	1	3.066	0.902	11.551	< 0.001	21.456
Risk (R)	1	-1.122	0.709	2.504	0.114	0.326
Constant	1	-2.323	0.785	8.765	0.003	0.098

A significant Wald Chi-Square value for a given variable indicates that the variable is significantly related to the response variable. Four out of the five variables are significantly related to the response variable. The parameter estimate generates the coefficients of the fitted logistic regression model, and they are used to formulate the following logistic regression equation (2):

$$\text{Logit}(\hat{p}) = -2.323 + 2.432(\text{ST}) + 2.703(\text{LD}) + 1.484(\text{QC}) + 3.066(\text{CL}) \text{ ----- (2)}$$

The sign (\hat{p}) indicates an estimated probability value (also called log odds) for the response variable *Project Value* (VL) to be 1, and logit represents logit transformation of the event probability.

The estimated coefficients indicates that when the variable Systems Thinking (ST) is present in a project, the logit transformation of the project being successful increases by 2.432, while even though risk is not significant, it shows that when the variable risk (R) is present in project, the probability that the project will be successful decreases by 1.122. This is consistent with literature as increased risk reduces the success rate for a project.

If the odds ratio for an explanatory variable is larger than 1, the probability of the response variable being 1 increases because of the presence of that explanatory variable. For example, the odds ratio for variable Leadership (LD) is 14.918 (see Table 8), indicating that a project is 14 times more likely to be successful if the principle of leadership is implemented in the project experience, compared to situations that do not have leadership principle implemented. However, if the odds ratio is smaller than 1, like we see in the case of the presence of risk (R), the probability of a project being successful decreases with the presence of risk.

DATA ANALYSIS FOR RESEARCH QUESTION 2

Q2: Are there significant differences in the proportions between successful and unsuccessful Project management in education cases in relation to the presence and absence of certain Project management principles?

CHI-SQUARE TESTS. For research question 2, Chi-Square (χ^2) test of independence was performed on each of the predictor variables. Chi-Square is a nonparametric test. It is a test where the researcher is interested in the number (or percentage, or proportion) of the examined subjects (people, things, responses, etc.) that fall into a number of categories

(Corder & Forman, 2014). It has been a very useful method for content analysis (Boettger & Palmer, 2010; D'Andrea et al., 2011).

In this study, the proportions between successful and unsuccessful project management in education cases in relation to the presence and absence of certain predictor variables was examined. Each of the 11 principles of project management together with AI tools was examined with Chi-Square (χ^2) by the two types of project management cases (successful or unsuccessful). Twelve 2 by 2 Chi-square tests were conducted where:

- The Row Variable (A) = each of the explanatory variables, with 2 categories (a1 = present, a2 = absent).
- The Column Variable (B) = response variable (Value of the project), with 2 categories (b1 = successful, and b2 = unsuccessful).

The following are the results.

SIGNIFICANT RESULTS.

STAKEHOLDER BY VALUE. The overall (χ^2) test result was significant: χ^2 (1, N=104) = 22.168, $p < .001$, and effect size Phi (ϕ) = 0.462, $p < .001$, indicating that the proportions of the two types of project success cases (successful and unsuccessful) were significantly different between those in which stakeholder principle was implemented, and those in which stakeholder principle was absent. In the 72 cases that were successful (b1), all 72 (100%) cases demonstrated the principle of stakeholder. In 32 cases that were unsuccessful (b2), 23 (71.9%) utilized the principle of stakeholder, and 9 (28.1%) did not.

STEWARDSHIP BY VALUE. The overall (χ^2) test result was significant: χ^2 (1, N=104) = 11.285, $p < .001$, and effect size Phi (ϕ) = 0.329, $p < .001$, indicating that the proportions of the two types of project success cases (successful and unsuccessful) were significantly different between those in which principle of stewardship was implemented, and those in which it was absent. In the 72 cases that were successful (b1), 52 (72.2%) demonstrated stewardship and 20 (27.8%) did not. In 32 cases that were unsuccessful (b2), only 12 (37.5%) showed stewardship, and 20 (62.5%) did not.

SYSTEMS THINKING BY VALUE. The overall (χ^2) test result was significant: χ^2 (1, N=104) = 14.928, $p < .001$, and effect size Phi (ϕ) = 0.379, $p < .001$, indicating that the proportions of the two types of project success cases (successful and unsuccessful) were significantly different between those in which principle of systems thinking was implemented, and those in which it was absent. In the 72 cases that were successful (b1), 38 (52.8%) demonstrated systems thinking, and 34 (47.2%) did not. In 32 cases that were unsuccessful (b2), only 4 (12.5%) showed systems thinking, and 28 (87.5%) did not.

TAILORING BY VALUE. The overall (χ^2) test result was significant: χ^2 (1, N=104) = 3.936, $p = 0.047$, and effect size Phi (ϕ) = .195, $p = 0.047$, indicating that the proportions of the two types of project success cases (successful and unsuccessful) were significantly different between those in which principle of tailoring was implemented, and those in which it was absent. In the 72 cases that were successful (b1), 25 (34.7.0%) demonstrated the principle of Tailoring, and 47 (65.3%) did not. In the 32 cases that were unsuccessful (b2), only 5 (15.6%) showed Tailoring and 27 (84.4%) did not.

ADAPTABILITY AND RESILIENCY BY VALUE. The overall (χ^2) test result was significant: χ^2 (1, N=104) = 15.447, $p < .001$, and effect size Phi (ϕ) = 0.385, $p < .001$, indicating that the proportions of the two types of project success cases (successful and unsuccessful) were significantly different between those in which principle of adaptability and resiliency was implemented, and those in which it was absent. In the 72 cases that were successful (b1), 52 (72.2%) demonstrated the principle of adaptability and resiliency, and 20 (27.8%) did not. In the 32 cases that were unsuccessful (b2), 10 (31.3%) showed adaptability and resiliency, and 22 (68.8%) did not.

CHANGE BY VALUE. The overall (χ^2) test result was significant: $\chi^2 (1, N=104) = 6.930$, $p = .008$, and effect size Phi (ϕ) = 0.258, $p = .008$, indicating that the proportions of the two types of project success cases (successful and unsuccessful) were significantly different between those in which principle of change was implemented, and those in which it was absent. In the 72 cases that were successful (b1), 38 (52.8%) demonstrated the principle of change, and 34 (47.2%) did not. In the 32 cases that were unsuccessful (b2), 8 (25.0%) showed change, and 24 (75.0%) did not.

LEADERSHIP BY VALUE. The overall (χ^2) test result was significant: $\chi^2 (1, N=104) = 20.24$, $p = <.001$, and effect size Phi (ϕ) = 0.441, $p = <.001$, indicating that the proportions of the two types of project success cases (successful and unsuccessful) were significantly different between those in which principle of leadership was implemented, and those in which it was absent. In the 72 cases that were successful (b1), 52 (72.2%) demonstrated the principle of leadership, and 20 (27.8%) did not. In the 32 cases that were unsuccessful (b2), 8 (25.0%) showed leadership, and 24 (75.0%) did not.

COMPLEXITY BY VALUE. The overall (χ^2) test result was significant: $\chi^2 (1, N=104) = 13.854$, $p = <.001$, and effect size Phi (ϕ) = .365, $p = <.001$, indicating that the proportions of the two types of project success cases (successful and unsuccessful) were significantly different between those in which principle of complexity was implemented, and those in which it was absent. In the 72 cases that were successful (b1), 31 (43.1%) demonstrated the principle of complexity, and 41 (56.9%) did not. In the 32 cases that were unsuccessful (b2), 2 (6.3%) showed complexity, and 30 (93.8%) did not.

QUALITY BY VALUE. The overall (χ^2) test result was significant: $\chi^2 (1, N=104) = 6.292$, $p = .022$, and effect size Phi (ϕ) = 0.246, $p = 0.012$, indicating that the proportions of the two types of project success cases (successful and unsuccessful) were significantly different between those in which principle of quality was implemented, and those in which it was absent. In the 72 cases that were successful (b1), 54 (75.0%) demonstrated the principle of quality, and 18 (25.0%) did not. In the 32 cases that were unsuccessful (b2), 16 (50%) showed quality, and 16 (50%) did not.

NONSIGNIFICANT RESULTS

The nonsignificant results indicated that the proportions of the two types of project success cases (successful and unsuccessful) were not significantly different between those in which a particular principle was present, and those in which that element was absent. The following three non-significant results are presented for reference.

TEAM BY VALUE. The overall (χ^2) test result was not significant: $\chi^2 (1, N=104) = 1.347$, $p = 0.246$, and effect size Phi (ϕ) = .114, $p = 0.246$, indicating that the proportions of the two types of project success cases (successful and unsuccessful) were not significantly different between those in which team principle was implemented, and those in which it was absent. In the 72 cases that were successful (b1), 49 (68.1%) demonstrated the principle of change, and 23 (31.9%) did not. In the 32 cases that were unsuccessful (b2), 18 (56.3%) utilized teams and 14 (43.8%) did not.

AI TOOLS BY VALUE. The overall (χ^2) test result was not significant: $\chi^2 (1, N=104) = 0.087$, $p = 0.816$, and effect size Phi (ϕ) = .029, $p = 0.768$, indicating that the proportions of the two types of project success cases (successful and unsuccessful) were not significantly different between those in which AI tools were implemented, and those in which it was absent. In the 72 cases that were successful (b1), 20 (27.8%) demonstrated the use of AI tools, and 52 (72.2%) did not. In the 32 cases that were unsuccessful (b2), 8 (25.0%) utilized use of AI tools, and 24 (75.0%) did not.

Examining Influential Factors on the Success of Project Management in Education

RISK BY VALUE. The overall (χ^2) test result was not significant: $\chi^2 (1, N=104) = 0.389$, $p = 0.670$, and effect size Phi (ϕ) = -0.061 , $p = 0.533$, indicating that the proportions of the two types of project success cases (successful and unsuccessful) were not significantly different between those in which AI tools were implemented, and those in which it was absent. In the 72 cases that were successful (b1), 38 (52.8%) demonstrated the principle of risk, and 34 (47.2%) did not. In the 32 cases that were unsuccessful (b2), 19 (59.4%) utilized risk and 13 (40.6%) did not.

Table 6 summarizes the results of Chi-Square tests. Nine out of the 12 explanatory variables are significant and three are not significant. Noticed that there is consistency between the results for the logistic regression analysis and Chi-square test. Four out of the five significant explanatory variables in logistic regression are also significant in the Chi-Square tests. Risk is the only variable that was significant in the logistic regression, but insignificant in the Chi-Square.

Table 6. Summary of Chi-Square Test Results.

Variable A Project management Principles	Variable B Value of Project		Chi-Square Results <i>df=1, N=104</i>			
	0 ^a N=32	1 ^b N=72	χ^2	<i>p</i>	Phi (ϕ)	
**Stakeholder	0 ^c	9 (28.1%)	0	22.146	< .001	0.462
	1 ^d	23 (71.9%)	72 (100%)			
**Stewardship	0	20 (62.5%)	20 (27.8%)	11.285	< .001	0.329
	1	12 (37.5%)	52 (72.2%)			
**Systems Thinking	0	28 (87.5%)	34 (47.2%)	14.928	< .001	0.379
	1	4 (12.5%)	38 (52.8%)			
**Tailoring	0	27 (84.4%)	47 (65.3%)	3.936	0.047	0.195
	1	5 (15.6%)	25 (34.7%)			
**Adaptability and Resiliency	0	22 (68.8%)	20 (27.8%)	15.447	< .001	0.385
	1	10 (31.3%)	52 (72.2%)			
**Change	0	24 (75%)	34 (47.2%)	6.930	0.008	0.258
	1	8 (25%)	38 (52.8%)			
**Leadership	0	24 (75%)	20 (27.8%)	20.24	< .001	0.441
	1	8 (25%)	52 (72.2%)			
**Complexity	0	30 (93.8%)	41 (56.9%)	13.854	< .001	0.365
	1	2 (6.3%)	31 (43.1%)			
**Quality	0	16 (50%)	18 (25%)	6.292	0.022	0.246
	1	16 (50%)	54 (75%)			
Team	0	14 (43.8%)	23 (31.9%)	1.347	0.246	0.114
	1	18 (56.3%)	49 (68.1%)			
AI tools	0	8 (25%)	52 (72.2%)	0.087	0.816	0.029
	1	24(75%)	20(27.8%)			
Risk	0	13 (25%)	34 (42.2%)	0.389	0.670	-0.061
	1	19 (59.4%)	38 (52.8%)			

Notes (**) Significant project management principles

a. unsuccessful; b. successful; c. element absent; d. element present

DISCUSSION AND CONCLUSION

This section discusses how the findings of the study align with existing literature on project management principles. It compares the observed relationships between key principles such as leadership, systems thinking, quality, and risk management and project success with those reported in previous studies. The discussion highlights areas of consistency with established theories and prior research, as well as points of divergence that offer new insights into the application of project management principles within educational and technology-integrated contexts.

CURRENT STATE OF PRINCIPLES OF PROJECT MANAGEMENT IN EDUCATION

Implementation of project management principles is a relatively new practice. Project management is an ever-evolving field and with the radical change from the requirement of PM knowledge areas to principles of project management in 2021, there is a need for consistent research. Projects, especially IT projects, have a failure rate of about 70% globally (PMI, 2021). Prior research by McManus & Wood-Harper, 2003 stated that managers fail generally because the various stakeholders have different or conflicting expectations about their roles.

Project management education has advanced significantly to address the increasing complexity of projects across industries. Various studies explore the effectiveness of training methods, gaps in education, and competency-based frameworks to enhance project management capabilities (Bukvić et al., 2020; Shtub et al., 2013).

Also, project management education has seen a transformation with the incorporation of artificial intelligence (AI), gamification, simulation-based learning, and digital transformation. These advancements aim to enhance student engagement, optimize risk management, and streamline project execution (Wamba-Taguimdje et al., 2020; Haase et al., 2023) leading to increased project success rate. There have been few studies on the knowledge areas and predictive approach to development in Project management, most studies focus on the impact of the triple constraint (time, scope and cost) on the success of a project, and there have not been enough studies that utilize the new principles of project management in predicting success in education.

Although a lot of progress has been made, project management in education still faces the challenges of balancing theoretical and practical approach and lack of standardized metrics for measuring success and effectiveness of educational projects. In this study, the researcher reviewed and analyzed 104 studies on project management in education published between 2010 and April 2025 in peer-reviewed journals.

PROJECT MANAGEMENT PRINCIPLES. Project management is the application of knowledge, skills, tools, and techniques to project activities to meet project requirements. It's the practice of planning, organizing, and executing the tasks needed to turn a brilliant idea into a tangible product, service, or deliverable (PMBOK® GUIDE, 2021). Project Management Principles are the fundamental norms, values, and guidelines that inform the planning, execution, and governance of projects to ensure successful outcomes. They are designed to be universal, adaptable across various industries and methodologies, and focused on delivering value while navigating complexity and change (Project Management Institute [PMI], 2021; Kerzner, 2017). For a project to deliver its value and be successful, the project manager is expected to implement the principles highlighted in this study. Since projects often involve cost and time, it is imperative to investigate the principles that have the greatest impact on the success of a project.

The purpose of this study was to examine the effects of project management principles on the success of a project indicated by its value. The results of the research question 1 from

data analysis showed that systems thinking, leadership, quality, complexity and risk were the principles that have the most impact on the value of a project.

Systems Thinking (ST): Projects that incorporate the principle of systems thinking were 11.4 times more likely to be successful compared to those that did not, controlling for other variables. This finding suggests that understanding how project components interrelate within a larger system greatly enhances project outcomes. The significant p-value ($p = .001$) emphasizes its predictive strength.

Leadership (LD). The presence of strong leadership increased the odds of success by almost 15 times. This aligns with prior research that highlights the pivotal role of leadership in mobilizing teams, aligning vision, and maintaining stakeholder engagement. Understanding that the principle of effective leadership can increase the odds of a successful project will help project managers and educators pay more attention and utilize the principle much better.

Quality (QC). Quality has a significant impact on the value of a project, hence its success. This result is consistent with the findings in Nuwagaba et al. (2024) where they highlighted quality as the core basement for ensuring cost effectiveness, timeliness, efficiency and students' satisfaction when it comes to execution of projects. This study found that Projects emphasizing quality processes were approximately 4.4 times more likely to succeed.

Complexity (CL). Interestingly, higher project complexity, when acknowledged and managed, was associated with 21.5 times increase in the odds of success. This suggests that when complexity is recognized and navigated skillfully, it may contribute to adaptive practices and better planning, thereby enhancing project outcomes. Educational projects often times are complex but understanding that complexity of a project does not imply that it would not be successful, but managing the complexity effectively is a principle that helps increase the odds of the project being successful.

From the research question 2, the Chi-Square test results further buttress the findings from R1. Nine of the twelve PM principles showed statistically significant differences in proportions between successful and unsuccessful projects as seen in Table 7.

Table 7. Chi- Square Results

PM Principle	χ^2	p	Effect Size (Phi ϕ)	Interpretation
Stakeholder	22.146	< .001	0.462	Strong association
Stewardship	11.285	< .001	0.329	Moderate association
Systems Thinking	14.928	< .001	0.379	Moderate to strong
Tailoring	3.936	0.047	0.195	Small but significant
Adaptability & Resiliency	15.447	< .001	0.385	Moderate to strong
Change	6.930	0.008	0.258	Moderate association
Leadership	20.240	< .001	0.441	Strong association
Complexity	13.854	< .001	0.365	Moderate to strong
Quality	6.292	0.022	0.246	Moderate association

IMPLICATION FOR PRACTICE

The findings underscore that the adoption of systems thinking, effective leadership, commitment to quality, and proactive complexity management are not just best practices; they are statistically significant predictors of success. Project managers, educators, and policymakers should integrate training and evaluation mechanisms that promote these

principles. Additionally, the exceptionally high odds ratios suggest that these principles are not marginally helpful—they are transformational when implemented with intent and fidelity.

The study's findings have several practical implications for project managers, institutional leaders, and policymakers in education:

Leadership training should be prioritized in project-based roles, especially those involving cross-functional teams. Effective execution of educational project often requires navigating complex organizational structures, managing diverse stakeholder interests, and adapting to evolving institutional goals. As such, project leaders need to be equipped with both technical project management skills and with strong leadership competencies, including strategic thinking, conflict resolution, and collaborative communication. By investing in targeted leadership development programs, educational institutions can enhance the overall success rate of initiatives and foster a culture of accountability, innovation, and sustainable change.

Systems thinking should be embedded in project planning curricula, with emphasis on mapping interdependencies and feedback loops. This approach enables project managers and institutional leaders to recognize and map interdependencies, causal relationships, and feedback loops that influence project outcomes. In educational settings, where changes in one area—such as curriculum, staffing, or technology—can have cascading effects on others, systems thinking equips practitioners to anticipate unintended consequences, identify leverage points, and design more resilient and coherent interventions. Embedding this mindset into training fosters a holistic approach that aligns short-term project actions with long-term institutional goals.

Complexity should be acknowledged and managed, not avoided—through scenario planning and adaptive frameworks. The nature of educational institutions, marked by policy shifts, diverse stakeholder expectations, and dynamic learning environments, demands flexible planning methods. Scenario planning allows teams to explore multiple possible futures and prepare for uncertainty, while adaptive frameworks (such as Agile, Lean, or hybrid approaches) promote continuous learning and iterative decision-making, it is important to acknowledge the complexity of the education system as this could foster more realistic planning and enhance the capacity for responsive and informed decisions throughout the project lifecycle.

Technology integration strategies should include training, change readiness assessments, and alignment with user needs. Successful technology adoption depends on aligning tools with user needs, institutional capabilities, and pedagogical goals. Training programs for educators should be tailored to different user groups, ensuring that staff and students have the competencies required to fully engage with the technology. Change readiness assessments can identify potential barriers such as infrastructure gaps or resistance from staff and guide the development of targeted support strategies. By grounding technology integration in thoughtful planning and inclusive implementation, educational institutions can maximize the benefits of digital transformation and reduce the risk of project failure.

LEADERSHIP AS THE CORNERSTONE FOR VALUE OF PROJECT

Leadership emerged as one of the most powerful predictors of success in both the logistic regression and Chi-Square results. This aligns closely with the findings of Turner and Müller (2005), who concluded that leadership competence—particularly in communicating vision, resolving conflict, and aligning stakeholder interests is pivotal to project success. In the context of education, where projects often involve diverse actors such as administrators, faculty, and students, leadership plays a unifying and strategic role.

Additionally, Dulewicz and Higgs (2005) emphasized the importance of emotional intelligence and transformational leadership in complex project environments—qualities likely to influence success in initiatives such as curriculum reform or digital transformation projects. The study also aligns with the idea that no leadership style is universally effective; instead, the best outcomes occur when leadership style is matched to organizational context, project complexity, and the degree of change involved. They introduced a leadership-context matrix that shows which leadership styles are best suited for different types of change.

System Thinking: This is another predictor that has a high impact on the value of a project. It had an odds ratio over 11 in the regression analysis and a highly significant association in chi-square results. This finding is consistent with Senge's (2006) work on learning organizations, where he argued that long-term success depends on the ability to see interconnections and feedback loops within systems. Projects that incorporated systems thinking likely benefited from better anticipation of unintended consequences, improved stakeholder alignment, and more sustainable implementation strategies. In complex educational institutions, where policies, academic programs, and technological infrastructure are deeply intertwined, systems thinking allows project leaders to navigate change holistically rather than in isolated silos.

Complexity: In this study, results showed that complexity was not a hindrance to success, it was one of the strongest predictors in the logistic model, with an odds ratio over 2. This result supports Remington and Pollack's (2008) assertion that acknowledging and managing complexity—rather than avoiding it—can lead to superior project planning and increased resilience. In successful cases, complexity may have prompted more rigorous needs assessments, broader stakeholder consultations, and adaptive implementation strategies. Projects that treat complexity as a challenge to be embraced, rather than eliminated, may ultimately produce more robust and scalable outcomes.

Stakeholder engagement and Quality: Stakeholder engagement and quality assurance also stood out as critical factors, especially in the chi-square results. These align with Bryde's (2008) findings, that active stakeholder involvement improves satisfaction and facilitates continuous alignment between project outputs and expectations. Similarly, Kerzner (2017) highlights that embedding quality metrics throughout a project not just at the final delivery ensures relevance, accuracy, and accountability. In education, where user satisfaction (students, faculty, policymakers) is closely tied to project legitimacy and longevity, these two principles are expected to be very strategic.

Adaptability, Change, and Tailoring: Agile Reflections. The principles of adaptability and resiliency, change management, and tailoring which are all significant in the chi-square analysis, reflect core Agile values. Agile project management encourages responsiveness to changing requirements and empowers teams to tailor processes to fit project contexts rather than rigidly follow templates.

This also supports Conforto et al. (2014), who found that agile practices are particularly effective in volatile environments where stakeholder needs evolve rapidly, and this is common in academic institutions navigating shifting policies and student expectations. The significance of these principles affirms that flexibility, when guided by vision and leadership, can drive project excellence.

AI tools and team presence did not significantly predict or associate with project success. This resonates with Marnewick and Labuschagne (2020), who observed that while digital tools can enhance efficiency, they do not substitute for strategic clarity, leadership, or stakeholder alignment. It is also consistent with the findings Kuzminska et al. (2024), who did a study to determine the benefits of using a single project management tool with a built-in Notion AI module containing templates and tips in accordance with project and team management processes to increase students' self-efficacy and found that intragroup

dynamics is a major factor affecting team performance in education, and AI tools can help. They found the use of AI tools in the implementation of a team-based learning project does not significantly enhance student social engagement; that is, the improvement of group dynamics relies more on the development of students' soft skills than on technological support for group interaction processes. However, the use of AI tools can help to reduce cognitive and emotional barriers at various stages of project implementation and team development.

Likewise, team presence, though fundamental, may not be impactful unless combined with effective leadership, communication, and cohesion. This suggests that technology and team structures are enablers, not determinants of project success.

THEORETICAL INTEGRATION

TECHNOLOGY ACCEPTANCE MODEL (TAM) .TAM emphasizes that users adopt technology based on perceived usefulness and ease of use (Davis, 1989). The non-significant finding for AI tools suggests that mere presence does not guarantee impact. If teams do not perceive AI applications as useful or easy to integrate, they are unlikely to leverage them effectively. This reinforces the idea that adoption needs to be accompanied with alignment, training, and leadership buy-in.

CONTINGENCY THEORY. Contingency Theory asserts that there is no one-size-fits-all approach to management. Project success is contingent on the fit between the context and the strategies employed. This theory is validated by the finding that Tailoring, even though the effect size is small, was still statistically significant. This could imply that projects that adjust frameworks to fit their specific educational contexts tend to have better outcomes. Moreover, the success of projects that implemented leadership, change management, and Adaptability suggests that contingency-based decision-making was crucial, in that leader who could respond to evolving conditions likely achieved better alignment between people, processes, and objectives in their organization.

AGILE PROJECT MANAGEMENT. Agile principles advocate for iterative planning, stakeholder feedback, and adaptability—three concepts that found strong support in the data. The significance of adaptability, change management, and stakeholder involvement aligns with Agile's emphasis on collaborative and responsive project environments (Beck et al., 2001). Educational projects that embedded these principles likely thrived due to their ability to evolve with stakeholder input and environmental change.

LIMITATIONS

There are some limitations to this study. First, the study explored a correlation design approach, and this type of design can only determine association and not causal relationship (Sprinthall, 2003). Also, the value which is the indicator for the success of the project is based on the author's description which has the potential of bias. Moreover, the lack of impact from AI tools may be a reflection of the unfamiliarity of these tools among project participants and not necessary in efficiency, as the sample size for AI tools was very small.

CONCLUSION

This study reinforces the idea that embodying the project management principles serves as the cornerstone of successful project management, particularly within the complex and evolving landscape of educational institutions. Leadership, systems thinking, quality,

complexity and risk management emerged as key differentiators of the value of a project which indicates success, aligning with both theoretical frameworks and empirical studies.

The convergence of these principles suggests that successful educational project management ought to be less about rigid methodologies and more about cultivating values-based, strategically aligned practices that remain responsive to institutional needs. For educational institutions navigating innovation and reform, whether in curriculum design, technological integration, or organizational restructuring, this study offers a practical framework for fostering adaptive, principle-centered project cultures in the education industry.

Future research should build upon these findings by examining how these core principles interact over time particularly in longitudinal or comparative contexts and how they manifest across different educational sectors, from K–12 to higher education, and across geographic and cultural boundaries. Understanding these interactions will be critical for refining project management practices and ensuring that educational initiatives not only succeed but thrive in complex systems. Ultimately, this study contributes to a growing body of knowledge advocating for intentional, principle-driven approaches to managing educational projects in an increasingly interconnected world.

REFERENCES

- Abbas, K., Nauman, A., Bilal, M., Yoo, J.-H., Hong, J. W.-K., & Song, W.-C. (2024). AI-Driven Data Analytics and Intent-Based Networking for Orchestration and Control of B5G Consumer Electronics Services. *IEEE Transactions on Consumer Electronics*, *70*(1), 2155–2169. <https://doi.org/10.1109/TCE.2023.3324010>
- Adebite, A., Adefemi, A., Adikwu, E., Abatan, A., Adekoya, O., & Obaedo, B. (2023). Innovations In Project Management: Trends and Best Practices. *Engineering Science & Technology Journal*, *4*, 509–532. <https://doi.org/10.51594/estj.v4i6.670>.
- Aladağ, H. (2023). Assessing the accuracy of ChatGPT use for risk management in construction projects. *Sustainability*, *15*(22), 16071. <https://doi.org/10.3390/su152216071>.
- Allen, S. A., & Gardner, J. L. (2021). Project management competencies in instructional design. *Online Journal of Distance Learning Administration*, *24*(2), n2.
- Austin, C., Browne, W., Haas, B., Kenyatta, E., & Zulueta, S. (2013). Application of project management in higher education. *Journal of Economic Development, Management, IT, Finance, and Marketing*, *5*(2), 75.
- Baker, R. L. (2014). Designing LibGuides as Instructional Tools for Critical Thinking and Effective Online Learning. *Journal of Library & Information Services in Distance Learning*, *8*(3–4), 107–117. <https://doi.org/10.1080/1533290X.2014.944423>.
- Beck, K., Beedle, M., van Bennekum, A., Cockburn, A., Cunningham, W., Fowler, M., ... Thomas, D. (2001). Manifesto for Agile Software Development. Agile Alliance. <https://agilemanifesto.org/>
- Bell, S. (2010). Project-based learning for the 21st century: Skills for the future. *The clearing house*, *83*(2), 39-43.
- Bello, Anuoluwapo (2025). Adaptive Project management Strategies for Complex, Multi-Stakeholder Environments: Balancing Agility, Risk, and Strategic Alignment Effectively. (2025). *International Journal of Computer Applications Technology and Research*. <https://doi.org/10.7753/IJCATR1402.1017>.
- Berelson, B. (1952). Content analysis in communication research. Free Press.
- Bestvina Bukvić, I., Buljubašić, I., & Ivić, M. (2020a). Project management education in Croatia: A focus on the IT sector needs. *Management*, *25*(1), 255–278. <https://doi.org/10.30924/mjcmi.25.1.14>.

- Betts, S. C. (2003). Contingency theory: Science or technology? *Journal of Business & Economics Research (JBER)*, 1(8). <https://doi.org/10.19030/jber.v1i8.3044>.
- Boettger, R. K., & Palmer, L. A. (2010). Quantitative content analysis: Its use in technical communications. *IEEE Transactions on Professional Communication*, 53(4), 346-357.
- Bryde, D. (2008) Perceptions of the Impact of Project Sponsorship Practices on Project Success. *International Journal of Project Management*, 26, 800-809.
- Buganza, T., Kalchschmidt, M., Bartezzaghi, E., & Amabile, D. (2013). Measuring the impact of a major project management educational program: The PMP case in Finmeccanica. *International Journal of Project Management*, 31(2), 285-298.
- Bukvić, I. B., Buljubašić, I., & Ivić, M. (2020). Project management education in Croatia: A focus on the IT sector needs. *Management: Journal of Contemporary Management Issues*, 25(1), 255-278.
- Burke, R. (2013). *Project management: planning and control techniques*. John Wiley & Sons.
- Burns, T., & Stalker, G. M. (1961). Mechanistic and organic systems of management. *The Management of Innovation*, 21, 96-125.
- Calavia, M. B., Blanco, T., Casas, R., & Dieste, B. (2022). Improving design project management in remote learning. *Sustainability*, 14(17), 11025.
- Calderón, A., Ruiz, M., & O'Connor, R. V. (2018). A serious game to support the ISO 21500 standard education in the context of software project management. *Computer Standards & Interfaces*, 60, 80-92.
- Marnewick, C., Marnewick, A. (2022). Digitalization of project management: Opportunities in research and practice, *Project Leadership and Society*, 3, 100061. <https://doi.org/10.1016/j.plas.2022.100061>.
- Cartwright, C., & Yinger, M. (2007). *Project management competency development framework—Second edition*. In PMI Global Congress 2007EMEA, Budapest, Hungary. Project management Institute.
- Cohen, J. (1960). A coefficient of agreement for nominal scales. *Educational and Psychological Measurement*, 20(1), 37-46.
- Conforto, E.C., Salum, F., Amaral, D.C., da Silva, S.L. and de Almeida, L.F.M. (2014), Can Agile Project Management Be Adopted by Industries Other than Software Development? *Project Management Journal*, 45, 21-34. <https://doi.org/10.1002/pmj.21410>.
- Corder, G. W. & Foreman, D. I. (2014). *Nonparametric statistics: A step-by-step approach* (2nd ed.), Hoboken, NJ: Wiley.
- Crawford, L., & Pollack, J. (2007). How generic are project management knowledge and practice? *Project management Journal*, 38(1), 87-96.
- D'Andrea, L. M., Waters, C., & Rudd, R. (2011). Using computer assisted qualitative software (CAQDAS) to evaluate a novel teaching method for introductory statistics. *International Journal of Technology in Teaching and Learning*, 7(1), 48-60.
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319–340.
- Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: A Comparison of two theoretical models. *Management Science*, 35(8), 982–1003.
- De Wit, A. (1988). Measurement of project success. *International Journal of Project Management*, 6(3), 164–170. [https://doi.org/10.1016/0263-7863\(88\)90043-9](https://doi.org/10.1016/0263-7863(88)90043-9).
- Donato, H., & Greenberg, T. (2025). What is project management? Definition, types and examples. Retrieved October 7, 2025 from <https://project-management.com/what-is-project-management/>

- Dougherty, MaryKate (2024). January 22, 2024. PMI Introduces PMI Infinity The All New AI Powered Resource For Project Professionals.
- Dulewicz, V., & Higgs, M. (2005). Assessing leadership styles and organizational context. *Journal of Managerial Psychology*, 20(2), 105–123.
- Editorial Team. (2025). Predictive Approach in Project Management: Benefits and Implementation. https://www.projectpractical.com/predictive-approach-project-management/#google_vignette.
- Even, A. M. (2024). Project management and Education: Improving Learning and Student Success. *International Journal of Curriculum Development and Learning Measurement*, 5(1), 1–27. <https://doi.org/10.4018/IJCDLM.353926>.
- Ewin, N., Luck, J., Chugh, R., & Jarvis, J. (2017). Rethinking project management education: A humanistic approach based on design thinking. *Procedia Computer Science*, 121, 503–510. <https://doi.org/10.1016/j.procs.2017.11.067>.
- Falcao, R., & Fernandes, L. (2016). Teaching Project management on-line: Lessons learned from MOOCs. *Open Praxis*, 8(4), 351. <https://doi.org/10.5944/openpraxis.8.4.357>.
- Farooq, M. S., Hamid, A., Alvi, A., & Omer, U. (2022). Blended Learning Models, Curricula, and Gamification in Project management Education. *IEEE Access*, 10, 60341–60361. <https://doi.org/10.1109/ACCESS.2022.3180355>.
- Fiedler, F. E. (1964). A contingency model of leadership effectiveness. In *Advances in experimental social psychology* (Vol. 1, pp. 149-190). Academic Press.
- Fisher, D. J., Schluter, L., & Toleti, P. K. (2005). Project Management Education and Training Process for Career Development. *Journal of Construction Engineering and Management*, 131(8), 903–910.
- Ginevri, W., & Trilling, B. (2018, January). Project management for education: The bridge to 21st century learning. Project Management Institute.
- Grötsch, V., Blome, C., & Schleper, M. (2013). Antecedents of proactive supply chain risk management – a contingency theory perspective. *International Journal of Production Research*, 51(10), 2842–2867. <https://doi.org/10.1080/00207543.2012.746796>.
- Haase, Jennifer & Djurica, Djordje & Mendling, Jan. (2023). The Art of Inspiring Creativity: Exploring the Unique Impact of AI-generated Images. In P. A. Pavlou, V. Midha, A. Animesh, T. A. Carte, A. R. Graeml, & A. Mitchell (Eds.), *AMCIS 2023 Proceedings: 29th Americas Conference on Information Systems, AMCIS 2023, Panama City, Panama, August 10-12, 2023* (Paper 10). Association for Information Systems. https://aisel.aisnet.org/amcis2023/sig_aiaa/sig_aiaa/10/
- Hanisch, B., & Wald, A. (2012). A bibliometric view on the use of contingency theory in project management research. *Project Management Journal*, 43(3), 4–23. <https://doi.org/10.1002/pmj.21267>
- Hanselman, K., & Liu, L. (2021). Characteristics of initial posts and peer engagement: density score analyses for social presence in online discussions. *Journal of Educational Technology Development and Exchange (JETDE)*, 14(2), 41-74.
- Harake, M. F. (2024). Introducing Project management Frameworks & Methodology. *PM World Journal*, 13 (3) *PM World Journal*, Vol. XIII, Issue III, March. Available online at <https://pmworldlibrary.net/wp-content/uploads/2024/03/pmwj139-Mar2024-Harake-Introducing-Project-Management-Frameworks.pdf>
- Harvey, N. D. (2021). A simple guide to inter-rater, intra-rater and test-retest reliability for animal behaviour studies.2-4. OSF Preprints. <https://osf.io/8stpy/>
- Hellström, M. M., Jaccard, D., & Bonnier, K. E. (2023). A systematic review on the use of serious games in project management education. *International Journal of Serious Games*, 10(2), 3-24. <https://doi.org/10.17083/ijsg.v10i2.630>

- Hendershot, S., Baine, K., & Prado, H. (2023, August 23). *Tips for using generative AI tools in project management* [Podcast episode]. In *Projectified*®. Project Management Institute. <https://www.pmi.org/projectified-podcast/podcasts/tips-for-using-generative-ai-tools-in-project-management>. .
- Hensman, N., Valenta, K., & Jaafari, A. (2004). Project management in Australia: state of play and trends. In Sixth International Conference of International Research Network of Organizing by Projects (IRNOP VI). Abo Akademi University, Turku.
- Huang, J. H., Lin, Y. R., & Chuang, S. T. (2007). Elucidating user behavior of mobile learning: A perspective of the extended technology acceptance model. *The Electronic Library*, 25(5), 585-598.
- Jääskä, E., & Aaltonen, K. (2022). Teachers' experiences of using game-based learning methods in project management higher education. *Project Leadership and Society*, 3, 100041. <https://doi.org/10.1016/j.plas.2022.100041>.
- Jääskä, E., Aaltonen, K., & Kujala, J. (2021). Game-Based Learning in Project Sustainability Management Education. *Sustainability*, 13(15), 8204. <https://doi.org/10.3390/su13158204>.
- Jaccard, D., Bonnier, K. E., & Hellström, M. (2022). How might serious games trigger a transformation in project management education? Lessons learned from 10 Years of experimentations. *Project Leadership and Society*, 3, 100047. <https://doi.org/10.1016/j.plas.2022.100047>.
- Joslin, R., & Müller, R. (2015). Relationships between a project management methodology and project success in different project governance contexts. *International Journal of Project Management*, 33(6), 1377-1392. <https://doi.org/10.1016/j.ijproman.2015.03.005>
- Joslin, R., & Müller, R. (2016). The relationship between project governance and project success. *International Journal of Project Management*, 34(4), 613-626. <https://doi.org/10.1016/j.ijproman.2016.01.008>
- Kerzner, H. (2017). *Project Management Metrics, KPIs, and Dashboards: A Guide to Measuring and Monitoring Project Performance*. Hoboken, NJ: John Wiley & Sons.
- Kerzner, H. (2017). *Project management: A systems approach to planning, scheduling, and controlling* (12th ed.). Hoboken, NJ: Wiley.
- Kostalova, J., Bednarikova, M., & Patak, M. (2018). Project management education in metallurgical companies in the czech republic. *Business, Management and Education*, 16(0), 54–64. <https://doi.org/10.3846/bme.2018.2223>.
- Kramarski, B., & Michalsky, T. (2010). Preparing preservice teachers for self-regulated learning in the context of technological pedagogical content knowledge. *Learning and Instruction*, 20(5), 434–447. <https://doi.org/10.1016/j.learninstruc.2009.05.003>
- Kuzminska, O., Pohrebniak, D., Mazorchuk, M., & Osadchyi, V. (2024a). Leveraging AI tools for enhancing project team dynamics: impact on self-efficacy and student engagement. *Information Technologies and Learning Tools*, 100(2), 92–109. <https://doi.org/10.33407/itlt.v100i2.5602>
- Landis, J. R., & Koch, G. G. (1977). An application of hierarchical kappa-type statistics in the assessment of majority agreement among multiple observers. *Biometrics*, 363-374.
- Lawrence, P. R., Lorsch, J. W., & Garrison, J. S. (1967). *Organization and environment: Managing differentiation and integration*. Harvard University Press
- Liu, L. (2022). Quantitative content analysis methods in instructional technology research: Defining, coding, analyzing and modeling (DCAM). *Journal of Educational Technology Development and Exchange (JETDE)*, 15(1), 19-46. <https://doi.org/10.18785/jetde.1501.03>
- Mallery, P., & George, D. (2000). *SPSS for windows step by step*.

- Manca, S., & Ranieri, M. (2017). Implications of social network sites for teaching and learning. Where we are and where we want to go. *Education and Information Technologies, 22*, 605-622.
- Marnewick, C. (2023). Student experiences of project-based learning in agile project management education. *Project Leadership and Society, 4*, 100096.
- Marnewick, C., & Labuschagne, L. (2011). An investigation into the governance of information technology projects in South Africa. *International Journal of Project Management, 29*(6), 661–670. <https://doi.org/10.1016/j.ijproman.2010.07.004>
- Martin, T. (2022). A literature review on the technology acceptance model. *International Journal of Academic Research in Business and Social Sciences, 12*(11), 2859-2884.
- McManus, J. J., & Wood-Harper, A. T. (2003). *Information systems project management: Methods, tools and techniques*. Pearson Education.
- Mertler, C. A., & Reinhart, R. V. (2017). *Advanced and multivariate statistical methods: Practical Application and Interpretation*. New York, NY: Routledge.
- Mir, F. A., & Pinnington, A. H. (2014). Exploring the value of project management: Linking project management performance and project success. *International Journal of Project Management, 32*(2), 202–217.
- Monserrat, M., Mas, A., Mesquida Calafat, A.-L., & Clarke, P. (2024). Applying Lean to Improve Software Project management Education. *IEEE Transactions on Engineering Management, 71*, 7496–7510. <https://doi.org/10.1109/TEM.2023.3264981>.
- Nuwagaba, I., Kiuluku, P., Kalaba, D., & Kakande, J. B. (2024). Quality Planning and Performance of Projects in Higher Education Institutions (HEIs). *Journal of African Education, 5* (3), 153-153–171. <https://doi.org/10.31920/2633-2930/2024/v5n3a9>.
- Odeh, M., & Patanakul, P. (2024). An effective method in project management education: A stepwise project modelled on a real-life project. *The International Journal of Management Education, 22*(3), 101079. <https://doi.org/10.1016/j.ijme.2024.101079>.
- Onatayo, D., Onososen, A., Oyediran, A. O., Oyediran, H., Arowoia, V., & Onatayo, E. (2024). Generative AI Applications in Architecture, Engineering, and Construction: Trends, Implications for Practice, Education & Imperatives for Upskilling—A Review. *Architecture, 4* (4), 877–902. <https://doi.org/10.3390/architecture4040046>.
- Pace, M. (2019). A Correlational Study on Project management Methodology and Project Success. *Journal of Engineering, Project, and Production Management, 9*, 56 - 65.
- Petri, G., von Wangenheim, C. G., Hauck, J. C. R., & Borgatto, A. F. (2019). Effectiveness of games in software project management education: An experimental study. *Journal of Universal Computer Science, 25* (7), 840-865.
- Project Management Institute. (2017). *A guide to the project management body of knowledge (PMBOK® Guide)* (6th ed.). Project Management Institute.
- Project Management Institute. (2021). *A guide to the project management body of knowledge (PMBOK® Guide)* (7th ed.). Project Management Institute.
- Price, P. C., Jhangiani, R., Chiang, C. A., Leighton, D. C., & Cuttler, C. (2017). *Research methods in psychology* (3rd ed.). Pressbooks. <https://opentext.wsu.edu/carriecuttler>
- Quixy Editorial Team. (2025, January 7). Important project management statistics for 2025 and beyond. Quixy Blog. <https://quixy.com/blog/important-project-management-statistics/>
- Ramazani, J., & Jergeas, G. (2015). Project managers and the journey from good to great: The benefits of investment in project management training and education. *International Journal of Project Management, 33*(1), 41–52. <https://doi.org/10.1016/j.ijproman.2014.03.012>.
- Rane, N., Choudhary, S., & Rane, J. (2024). Contribution of ChatGPT and similar generative Artificial Intelligence for enhanced climate change mitigation strategies. SSRN. <https://doi.org/10.2139/ssrn.4681720>

- Remington, K., & Pollack, J. (2008). *Tools for Complex Projects* (1st ed.). New York, NY: Routledge. <https://doi.org/10.4324/9781315550831>
- Rourke, L., & Anderson, T. (2004). Validity in quantitative content analysis. *Educational Technology Research and Development*, 52(1), 5-18.
- Ruefenacht, S., Gebhardt-Henrich, S., Miyake, T., & Gaillard, C. (2002). A behaviour test on German Shepherd dogs: heritability of seven different traits. *Applied Animal Behaviour Science*, 79 (2), 113-132.
- Sanusi, I. T., Olaleye, S. A., Agbo, F. J., & Chiu, T. K. (2022). The role of learners' competencies in artificial intelligence education. *Computers and Education: Artificial Intelligence*, 3, 100098.
- Schwaber, K., & Sutherland, J. (2011). The scrum guide. *Scrum Alliance*, 21(1), 1-38.
- Senge, P. (2006). *The Fifth Discipline: The art and practice of the learning organization*. New York, NY: Random House Books.
- Serrador, P., & Pinto, J. K. (2015). Does Agile work? —A quantitative analysis of agile project success. *International Journal of Project Management*, 33(5), 1040-1051. <https://doi.org/10.1016/j.ijproman.2015.01.006>
- Shelley, A. W. (2015). Project management and leadership education facilitated as projects. *International Journal of Managing Projects in Business*, 8(3), 478-490. <https://doi.org/10.1108/IJMPB-09-2014-0059>.
- Shen, F., Roccasalvo, J., Zhang, J., Tian, Y., & Yi, Y. (2023). Online technological STEM education project management. *Education and Information Technologies*, 28(10), 12715–12735. <https://doi.org/10.1007/s10639-022-11521-7>.
- Shen, S., Yang, H., & Zhou, Q. (2023). Development of Academic Programs in the Digital Age: Practice from China. In *Handbook of Educational Reform Through Blended Learning* (pp. 125-157). Singapore: Springer Nature Singapore.
- Shtub, A. (2013). Simulation Based Training (SBT)—the next generation of project management training. *PM World Journal*, 2 (11), 1-11.
- Silvius, G., & Schipper, R. (2018). Exploring Responsible Project management Education. *Education Sciences*, 9 (1), 2. <https://doi.org/10.3390/educsci9010002>.
- Spikes, M. A., & Rapp, D. N. (2022). Examining instructional practices in news media literacy: Shifts in instruction and co-construction. *Information and Learning Sciences*, 123(1/2), 26–44. <https://doi.org/10.1108/ILS-08-2021-0072>.
- Sprinthall, R. C. (2003). *Basic statistical analysis* (7th ed.). New York, NY: Pearson.
- Špundak, M. (2014). Mixed agile/traditional project management methodology—reality or illusion?. *Procedia-Social and Behavioral Sciences*, 119, 939-948.
- Statsenko, L., Samaraweera, A., Bakhshi, J., & Chileshe, N. (2022). Construction 4.0 technologies and applications: A systematic literature review of trends and potential areas for development. *Construction Innovation*. <https://doi.org/10.1108/CI-07-2021-0135>.
- Teo, T. (2011). Factors influencing teachers' intention to use technology: Model development and test. *Computers & Education*, 57(4), 2432–2440.
- Tews, T., Skulmoski, G., Langston, C., & Patching, A. (2020a). Innovation in project management education—Let's get serious! *Construction Economics and Building*, 20 (3). <https://doi.org/10.5130/AJCEB.v20i3.7040>.
- Thomas, J., & Mengel, T. (2008). Preparing project managers to deal with complexity—Advanced project management education. *International Journal of Project Management*, 26(3), 304-315. <https://doi.org/10.1016/j.ijproman.2008.01.001>
- Too, E. G., & Weaver, P. (2014). The management of project management: A conceptual framework for project governance. *International journal of project management*, 32(8), 1382-1394. <https://doi.org/10.1016/j.ijproman.2013.07.006>

- Tumpa, R. J., Ahmad, T., Naeni, L. M., & Kujala, J. (2024). Computer-based games in project management education: A review. *Project Leadership and Society*, 5, 100130. <https://doi.org/10.1016/j.plas.2024.100130>.
- Turner, J. R., & Müller, R. (2005). The project manager's leadership style as a success factor on projects: A literature review. *Project Management Journal*, 36(1), 49–61.
- Uriarte-Gallastegi, N., Arana-Landín, G., Landeta-Manzano, B., & Laskurain-Iturbe, I. (2024). The role of AI in improving environmental sustainability: a focus on energy management. *Energies*, 17 (3), 649. <https://doi.org/10.3390/en17030649>.
- Wamba-Taguimdje, S.-L., Fosso Wamba, S., Kala Kamdjoug, J.R. and Tchatchouang Wanko, C.E. (2020), "Influence of artificial intelligence (AI) on firm performance: the business value of AI-based transformation projects", *Business Process Management Journal*, 26 (7), 1893-1924. <https://doi.org/10.1108/BPMJ-10-2019-0411>.
- Weller, M. (2011). *The digital scholar: How technology is transforming scholarly practice* (p. 208). New York, NY: Bloomsbury Academic.
- Wilson, S. (2022). Student perception of learning versus performance in project management education. *Journal of Management and Business Education*, 5(1), 48–62. <https://doi.org/10.35564/jmbe.2022.0004>
- Wolf. (1986). *Meta-analysis: Quantitative methods for research synthesis*. Thousand Oaks, CA: Sage Publications.
- Woolard, N. A. (2018). Rethinking management group projects with the adaptive leadership model: The lesson is the process. *Journal of Education for Business*, 93(8), 392–402. <https://doi.org/10.1080/08832323.2018.1496895>.
- Zhang, J., Xie, H., & Li, H. (2019). Improvement of students' problem-solving skills through project execution planning in civil engineering and construction management education. *Engineering, Construction and Architectural Management*, 26(7), 1437-1454.
- Zhang, L., & Ma, Y. (2023). A study of the impact of project-based learning on student learning effects: A meta-analysis study. *Frontiers in psychology*, 14, 1202728.