Exploring the perspectives of Australian primary school teachers on students learning about project management

Sante Delle-Vergini, Douglas Eacersall, Chris Dann, Mustafa Ally
University of Southern Queensland, Australia
Subrata Chakraborty
University of New England, Australia

Projects have been used in primary school education for over a century. As managing projects has become increasingly critical in the workplace, educators have an opportunity to prepare young children with the necessary project management knowledge and skills to succeed in the future. However, in the absence of empirical studies, it is difficult to know if, when and how this preparation is taking place. This study sought to explore the perspectives of Australian primary school teachers about children learning project management. Thirteen primary school teachers participated over a seven-month period. Qualitative data from interviews and surveys were transcribed and entered into *NVivo*. Reflexive thematic analysis was used to analyse, interpret, and present a story reflective of the teachers' experiences and thoughts. The results revealed several project management concepts being taught to students but fell short of a comprehensive approach to managing projects. While more challenges than benefits were reported by teachers, their recommendations for improving project management teaching in the future was the most important finding. As the first empirical study of primary school teachers and their perspectives on teaching project management, researchers and educators now have a foundation of knowledge to develop more comprehensive ways of teaching this important discipline to primary school students.

Introduction

Teachers and children have been using projects in primary schools for more than a century after it was popularised as the *project method* by leading educational progressivist William Heard Kilpatrick (Pomelov, 2021). In recent decades, learning with projects has evolved to become a powerful curriculum instruction technique known as *project-based learning* (Pecore, 2015), which is a "teaching method in which students learn by actively engaging in real-world and personally meaningful projects" (Buck Institute for Education, n.d.). It is grounded in constructivism (Jones, 2017; Lu et al., 2021; Pecore, 2015) where the primary focus is the process of learning itself (Phye, 1997). Outside the school environment, many organisations use these real-world projects to produce their products and services, with most of their employees involved in project-related work of some kind (Konstantinou, 2015). To varying degrees, all these projects need to be managed by individuals well-versed in *project management*, which is defined as "the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements" (Project Management Institute [PMI], 2021a, p. 245). Moreover, it is a complex discipline with multiple components that must be effectively managed through to the successful completion of the project (PMI, 2017).

While there has been an abundance of literature regarding the discipline of project management in practice, education, and research, it is focused primarily on adults within the workplace. Turner et al. (2012) studied the evolution of project management research by examining peer-reviewed articles in three leading project management research journals over a twenty-year period. Padalkar and Gopinath (2016) performed a systematic literature review spanning six decades of project management research. In the Asia-Pacific region, Young and Pasian (2015) published a series of monographs focused on project management research from an Asia-Pacific perspective. Within Australia, Young (2017) presented research from the Australian project management academic community. Some authors even studied the evolution of project management from ancient times to the present day (Bonner, 2021; Chiu, 2010; Kozak-Holland, 2011). In all of these, the topic of children learning project management was completely absent. In fact, as Delle-Vergini et al. (2023a) discovered in their international scoping review of teaching project management to primary school children, peer-reviewed articles on the topic were simply non-existent in the literature. While some elements of project management were found in primary school classrooms, a holistic approach to teaching project management to children was not evident.

Recognising the interdisciplinary nature of the topic, Delle-Vergini et al. (2023a) called upon educators and project management practitioners to collaborate on more comprehensive approaches to teaching project management to children, and to contribute to this new field in research literature. In a subsequent project, Delle-Vergini et al. (2023b) conducted an international Delphi study of project management experts in eight countries on their perceptions of children learning project management. The study found ten technical (hard) skills and twenty interpersonal (soft) skills that children need to develop in order to successfully manage a project from beginning to end. Further, some of these skills were more important than others for project success, and some were more difficult than others for children to learn. One of the key recommendations from the study was that further research should be conducted to explore the perceptions of primary school teachers since they are best placed to observe and comment on project management teaching within the classroom. While both studies from Delle-Vergini et al. (2023a, 2023b) were crucial in furthering our understanding of teaching project management in primary schools, they did not provide a clear view into the primary school classroom, nor the perceptions of primary school teachers on the topic.

Within an Australian context, the Australian Curriculum, Assessment and Reporting Authority (ACARA) considered project management to be an essential skill for students to learn at every year level as they will be required to manage projects from inception to completion (ACARA, 2012). Further, as noted in ACARA's *Digital Technologies in Focus* project, students "... may not initially come with the skills required to complete project work. They need to be explicitly taught any new knowledge, skills, techniques and strategies necessary for the project, then guided as they develop and practice the knowledge and skills and reflect upon their learning." (ACARA, 2020, p. 8). More specifically, they will be required to:

> Students will develop skills to manage projects to successful completion through planning, organising and monitoring timelines, activities and the use of resources. This includes considering resources and constraints to develop resource, finance, work and time plans; assessing and managing risks; making decisions; controlling quality; evaluating processes and collaborating and communicating with others at different stages of the process. (ACARA, 2024)

The Australian Curriculum does not provide a framework or methodology for how teachers should teach project management to children. Further, the term *project management* is only mentioned a few times, and in just one of the eight learning areas (subjects) within the Australian Curriculum being in *Technologies* (ACARA, 2022). Therefore, it is unclear if, how, or to what level of comprehensiveness project management is being taught in the primary school classroom. From 2017 until 2021, ACARA was funded by the Australian Government to support the implementation of the Technologies learning area in over 160 schools across the country, which presumably would include implementing project management teaching. This nationwide initiative was called *Digital Technologies in Focus* (DTiF) (ACARA, 2023). In 2019, the principal investigator communicated with the DTiF implementation team to inquire if project management teaching in the classroom was a part of the program. The response was that collecting evidence of project management in schools was not a specific focus of the program. Subsequently, in 2020, DTiF published *Teaching and supporting project management in the classroom F-6* (ACARA, 2020). While the document detailed several project elements that should be included in a comprehensive approach to teaching children about project management, it did not contain empirical evidence of these teachings in the primary school classroom. Further, the document was partly adapted using a single source from 2002 (ACARA, 2020, p.6), a source that the research team was unable to recover. The DTiF team later advised the principal investigator that the purpose of the document was only to provide some background on project management to primary school teachers rather than a scaffolded approach to teaching project management.

The purpose of our article is to explore the perspectives of Australian primary school teachers on children learning about project management. The following research questions formed the foundation of this inquiry: (i) What does project management teaching look like in Australian primary school classrooms? (ii) What are some of the challenges of children learning about project management? (iii) How can educators improve ways of teaching project management to children? It is hoped that this study will inform educators and policymakers to explore comprehensive approaches to teaching project management to primary school children. It is the first empirical study of teaching project management to children from the perspective of primary school teachers.

Methods

The principal investigator views the world through the ontological lens of relativism, whereby there is no one universal truth or reality (Damico, 2019; Yin, 2018), and the epistemological stance of constructionism, where meaning is constructed within the

individual's mind through their engagement with the world (Behar-Horenstein, 2018); meaning and truth are not simply *out there* to be discovered (Sabnis & Newman, 2023).

In order to capture, analyse, interpret, and report on the perspectives of primary school teachers regarding children learning project management, we were guided by Braun and Clarke's (2022) process of *reflexive thematic analysis* (TA). TA is a flexible research approach that utilises coding procedures to develop meaning and identify patterns in data (Ozuem et al., 2022). It is a "...fully qualitative approach - involving the use of qualitative research techniques, underpinned by qualitative research values" (Braun et al., 2023, p. 25). However, unlike more traditional forms of TA, reflexive TA firmly situates the researcher at the centre of a collaborative knowledge creation process where the values, choices, beliefs, personal background, and philosophical assumptions of the researcher are critical tools in the research process (Braun & Clarke, 2022). Moreover, the constructionist researcher does not view "...reflexivity as an apology for the lack of objectivity in a research project" (Olmos-Vega et al., 2023, p. 242) but rather celebrates it. Renowned qualitative research author Robert K. Yin warned that reflexivity may produce an unwanted *colouring* of the interview process (Yin, 2018). However, it is precisely this multi-faceted colouring of knowledge co-production, partly facilitated by the influence of the principal investigator as a project management professional in collaboration with educators, that we sought and viewed as "...essential and inevitable, if not treasurable" (Leung, 2015, p. 324).

Participant and school selection

Since the aim of this study was to understand the perceptions of primary school teachers about children learning project management, a homogeneous sample of the Australian teaching population was sought. Homogeneous sampling is a form of purposive sampling (Bloomberg & Volpe, 2019; Punch & Oancea, 2014) whereby the target sample within a population shares some key characteristics (Saunders et al., 2023) such as, in this case, primary school teachers within Australia.

Table 1: Selection criteria

Criterion	
Schools	1. Geographical location: minimum 2 States/Territories 2. School type: government and non-government 3. Socio-educational background: high/medium/low ICSEA bands
Participants	1. Australian primary school teachers 2. Number of interviews: minimum 5

Note: ICSEA (Index of Community Socio-Educational Advantage) is a scale of socio-educational advantage that compares the educational advantage or disadvantage of each school (ACARA, 2015).

Selection criteria (see Table 1) were produced to ensure: (i) sample homogeneity among prospective participants (Velasco, 2022) that was "...typical of the population under study" (Creswell & Guetterman, 2019, p. 139); (ii) adequate representation across a range of

socio-educational backgrounds, geographical locations, and school types; and (iii) at least 5 interviews as recommended by Braun et al. (2019, p. 852) for effective thematic analysis. The selection process continued until all criteria were met.

The research team contacted approximately 75 schools over two months. *LinkedIn* was also used to identify potential participants. This resulted in 13 participants from 10 primary schools. A more detailed explanation of the recruitment process is provided in Appendix A. The participant demographics are detailed in Table 2, while school profiles are detailed in Table 3. Participants were anonymised through using identifiers (e.g., participant 1 is T-01, participant 2 is T-02, etc…) and de-identification of the data.

Table 2: Participant demographics

ID	School	Experience (years)	Participation	
			Survey	Interview
T-01	1	12	Yes	No
T-02	1	2	Yes	Yes
T-03	1	11	Yes	Yes
T-04	1	3	Yes	No
T-05	2	30	Yes	Yes
T-06	3	25	Yes	No
T-07	4	13	Yes	Yes
T-08	5	3	Yes	Yes
T-09	6	8	Yes	No
T-10	7	6	Yes	Yes
T-11	8	9	Yes	No
T-12	9	1	Yes	No
T-13	10	10	Yes	No

Table 3: School profiles

School	State	Sector	No. of Students	ICSEA		
				Value	Percentile	Band
1	VIC	Government	275	954	26	3
2	VIC	Non-gov	265	1109	87	6
3	VIC	Government	162	918	14	2
4	VIC	Non-gov	701	1087	81	6
5	VIC	Non-gov	59	1001	47	4
6	VIC	Non-gov	1995	966	31	3
7	QLD	Government	775	1161	97	7
8	VIC	Non-gov	329	1149	95	7
9	NSW	Government	566	1114	88	6
10	VIC	Government	326	1143	94	7

Data collection and analysis

Qualitative data from both the semi-structured interviews and surveys informed the research. The data collection phase lasted from November 2022 until June 2023. As the

audio for interviews was recorded with the permission of each participant, the principal investigator transcribed each interview and qualitative survey response, generating 19 files (6 interviews and 13 surveys). These files were then imported into *NVivo* as the primary analysis tool. As the dataset was analysed multiple times, the researcher moved from familiarisation and immersion in the data to a more critical engagement with the data (Braun & Clarke, 2022). Data extracts were eventually categorised into codes, and codes into themes, as a story began to take shape. Themes are the pinnacle of this story since they are reflective of the participant interviews and documents generated (Saldana, 2016). They did not emerge from the data but were instead created through the "situated analytic practice" (Braun & Clarke, 2022, p. 128) of the principal investigator's engagement with participants, the dataset, and reflexive techniques.

Findings and discussion

The three research questions underpinned the generation of themes and topic summaries. Unlike themes, which are abstract entities of shared meaning organised around a central concept, topic summaries simply report on the range of responses on a particular topic, "...kind of like an overview" (Braun & Clarke, 2022, p. 104). However, we believe they provide contextual relevance to the themes presented later in this paper. The mapping of the research questions to themes and topic summaries is illustrated in Figure 1.

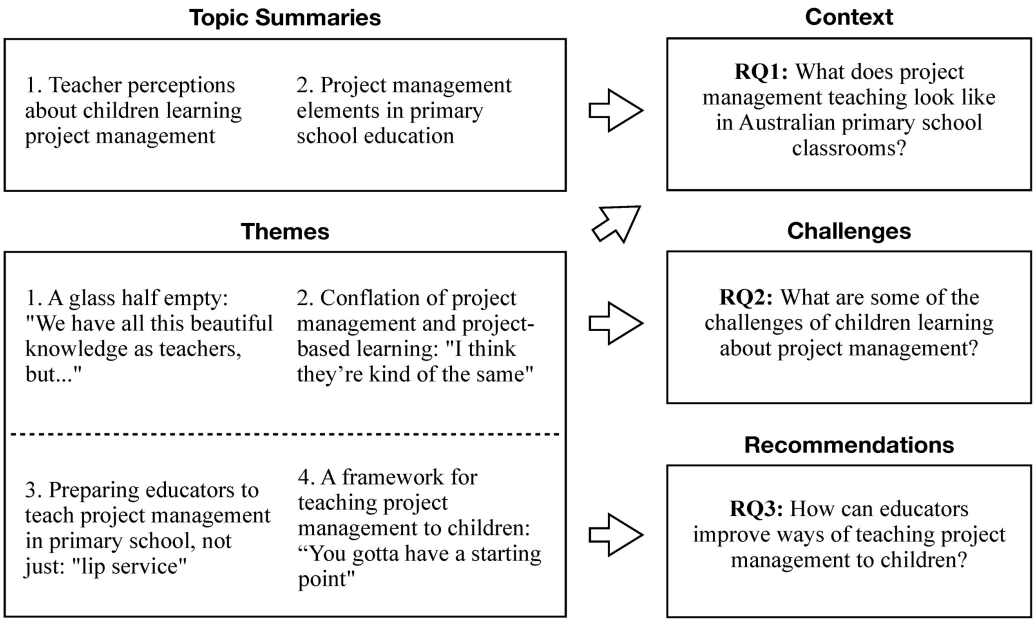


Figure 1: Mapping research questions to topic summaries and themes

A major part of identifying the themes from this research was the generation of two *topic summaries*: (i) teacher perceptions about children learning project management; and (ii) project management elements in primary school education. These topic summaries begin

to address the first research question: ***What does project management teaching look like in Australian primary school classrooms?***

Teacher perceptions about children learning project management

Teachers were overwhelmingly supportive of children learning project management in primary school, as it is an "essential" (T-03, T-07) "life skill" (T-06, T-08) that will be required in the future (T-03, T-04, T-07). Some of the benefits of children learning project management include communications skills, teamwork (T-02, T-05, T-07, T-10, T-11), problem-solving, executive functioning skills, increased confidence (T-08), patience, conflict management, time management (T-05), creativity (T-02), collaboration (T-05, T-07), organisation skills (T-09), emotional intelligence (T-11), and leadership (T-03, T-09, T-10). Learning project management also provides a "practice platform" (T-10) for these and other soft skills to develop over time. Teachers felt that soft skills were as important (53.8%), if not more important (46.2%), for children to develop than the technical skills and knowledge required in project management. There were no teachers who believed that technical skills were more important than soft skills. By contrast, in the Delle-Vergini et al. (2023b) study of project management experts, 64.7% said that soft skills were more important for children to learn, 11.8% said technical skills, and 23.5% said both were equally important. While the project management literature has "...always focused on the hard [technical] skills deemed necessary to manage projects, relegating soft skills to the background" (Alvarenga et al., 2019, p. 287), young children also need to develop a range of soft skills in order to manage even the simplest projects.

One critical benefit of learning project management is to manage a project from "start to finish" (T-11). Children need to experience a number of different projects from start to completion to know what success and failure look like since most projects will result in one or the other (Kerzner, 2022). In this way, "...when a project comes to a conclusion...one can feel very happy and satisfied with a job well completed" (T-05). As children continue to develop project management and learn what makes a project successful, they will have the "...ability to approach any project in their life" (T-08). This does not just apply inside the classroom but outside the primary school as well, such as home projects (T-13), high school (T-11), higher education (T-07), "adulting in general" (T-03), and perhaps most importantly, their future careers (T-03, T-07, T-09, T-13).

Regarding future careers, T-13 asserted that "a lot of jobs have projects, so students need to be shown from an early age how to manage these". It is forecasted that by 2030, approximately 102 million project management-oriented employees performing both skilled and less formal project management roles will be required (PMI, 2021b, p. 4). The following quote from T-07 captures the importance of the skills mentioned in this section and how they apply to a child's future career:

> The amount of skills that one obtains and exercises through project management is immeasurable. These skills are transferable to many workplaces. The development of independent thinkers and learners should be our ultimate goal. Project management is an avenue towards this. (T-07)

Not all teachers agreed as to exactly when a child should start learning about project management. Two teachers (T-09, T-11) were undecided as to whether or not primary school was a suitable starting point. However, when asked to select from only three age ranges in a subsequent question: 0-4 years, 5-11 years, or 12-17 years, both selected 5-11 years. While T-09 did not give a reason for being undecided, T-11 stated that although there is a need to teach children how to manage projects, they must develop their emotional intelligence and relationship-building skills to be successful in project management. Most teachers felt that 5-11 years old, or primary school age, was the best time to begin learning project management, with three teachers (T-03, T-05, T-13) claiming that children should start even earlier. In order to get teachers to be more specific as to when children should begin learning project management only within a primary school setting, we presented the three bands of year levels for the Australian primary school curriculum, which are: (i) Foundation to Year 2 (F-2); (ii) Years 3 and 4 (3-4); and (iii) Years 5 and 6 (5-6). Most teachers selected F-2, with five teachers (T-01, T-04, T-08, T-11, T-12) selecting 3-4, and one (T-10) selecting 5-6. The statement of two teachers (T-05, T-12) perfectly represents the majority view as: "the earlier, the better", with T-05 going one step further, adding:

> Children of all ages are highly capable. There is no need to mollycoddle children. Two-year-olds can empty dishwashers ... get themselves dressed, make their beds. We as adults limit children's abilities to explore their outside and inside environments. So hence, in the right primary school environment, there should be no holding back on children and their capabilities on managing projects. (T-05)

T-08 explained that some children hesitate when approaching a project. They often feel overwhelmed when faced with the daunting task of breaking down the various components of what they perceive to be a large project. These students can be self-critical, lack confidence and slide into the default position of “I can't do this”. Learning project management can help these children to break down project components individually and “...promote a greater level of confidence” (T-08).

In the next section, we examine the primary school classroom to evidence project management *elements* that "... describe the project management activities, processes, and artefacts typical of many projects" (Delle-Vergini, 2023a, p. 4).

Project management elements in primary education

Participants described many different forms of projects within primary education. Projects allowed children to design a small business such as braiding, photography (T-07), or a stall/shop (T-02) where they considered business design, products, services, pricing, and resources. Other projects took the form of research/inquiries (T-03, T-05, T-08, T-10), trivia nights, athletics days (T-03), concerts, fundraisers (T-05), works of art (T-02, T-03, T-05), and community/charity initiatives (T-03, T-05). Most of these projects were initiated and driven by teachers, but some students also "... have little interests that they create their own projects around; they have an idea in their mind and they work towards making it" (T-08). Projects can also last from a couple of weeks (T-08) to a few years (T-05).

During project work, students are involved in several project management activities, such as project planning (T-02), budgeting (T-02, T-03, T-05, T-07, T-08), obtaining resources (T-07), defining roles and responsibilities (T-03, T-08), procurement (T-03), and presenting their projects to an audience (T-02, T-03, T-07, T-08). They also produce a number of project management artefacts, which are the outputs created during the project process (Richardson & Jackson, 2019), or more specifically, "... any items that assist project team members in conducting project management activities" (Delle-Vergini et al., 2023a, p. 10). These include checklists (T-03, T-08), templates (T-03), notebooks, project walls that visually display various aspects of a project (T-02), project calendars, traffic lights during inquiry projects where green would be for students who feel confident in a particular area and orange for when assistance may be needed, egg timers to "...help break the time down" (T-08), portfolios for documenting projects (T-03, T-05), and some kind of criteria to know when a project is successful or complete (T-02, T-03, T-07, T-08), such as an assessment rubric (T-08).

While it was encouraging to find teachers who felt it was important for children to learn project management, and that many project management elements are present in Australian primary school projects, a prolonged analysis of the entire survey/interview dataset produced four themes that we feel capture deeper insights, particularly regarding the main challenges and recommendations for effective teaching of project management to children. These themes are: (i) Glass half empty: "We have all this beautiful knowledge as teachers, but..."; (ii) Conflation of project management and project-based learning: "I think they're kind of the same"; (iii) Preparing educators to teach project management in primary school; not just "lip service"; and (iv) A framework for teaching project management to children: "You gotta have a starting point". The first two themes answer the first and second research questions: *What does project management teaching look like in Australian primary school classrooms? What are some of the challenges of children learning about project management?* The final two themes answer the third research question: *How can educators improve ways of teaching project management to children?*

A glass half empty: "We have all this beautiful knowledge as teachers, but..."

This first theme was named *a glass half empty* for two reasons: (i) an analysis of the dataset revealed more challenges than benefits when teaching project management to children; and (ii) we sensed that most teachers seemed resigned to the status quo, that the power for change was outside their control. While some of the challenges revolved around the students inside the classroom, which we will discuss in the first half of this section, we were surprised to find a significant degree of frustration exhibited by teachers when articulating the challenges they face outside the classroom, discussed in the second half.

Inside the classroom, children experienced a number of challenges when learning project management. Firstly, students have different learning styles. *Exploratory/guided:* T-02 said that "...some kids really love the exploration ...but then some kids ...need to be led". Other children are more adaptive and can swap between both styles without much difficulty. *Pace:* children also learn at different speeds, so some lesson plans cannot always follow the same timeline for everyone.

Secondly, children have different capabilities and dispositions. *Big personalities:* the classroom always has a number of "big personalities" (T-03) where the teacher sometimes needs to exercise a degree of behaviour management to promote effective teamwork. *Leadership:* there are also natural leaders that emerge in the class, and those that prefer to take a more passive role in projects (T-09). Sometimes, "...it will be 'ok I'm doing everything; I'm a leader'...so that's that explicit teaching of those soft skills as well what does leadership actually mean ...it doesn't mean you do everything" (T-03). *Room to grow:* in some other projects, peer learning and peer tutoring are actively encouraged. However, while both approaches can lead to increased knowledge and skills (Chen et al., 2020), some children will "...over-compensate for that [other] child to the point where they don't have the chance to push themselves to grow" (T-08). *Conflict:* T-05 pointed out that many children are sometimes risk averse and incapable of making a decision in a project because they have been "...wrapped in cotton wool" and not allowed to:

> ... have a little scrap with someone on the way or have a little "oh I don't like this and you don't like that and I don't want this colour" ...they're the interplays and working on the psychology of people that helps longitudinally with a better project result. (T-05)

Thirdly, some schools have a significant student population that is from a *language other than English* (LOTE) background. Since project management is a complex discipline with processes, activities and concepts that must be "...interpreted, modified, and presented to primary school students so that they understand all of the separate interconnecting parts" (Delle-Vergini et al., 2023a, p. 17), some LOTE students struggle with project management concepts and terminologies.

The challenges mentioned above can be improved through effective teacher intervention because teachers have a high degree of control over their classroom environment. However, they have less control over many of the challenges they face outside the classroom. *So much admin; too little time:* one teacher (T-08) expressed frustration with administrative tasks that took time away from quality teaching.

> We have all this beautiful knowledge as teachers, but with...our administrative duties um we're not necessarily able to put effort and time into, you know, integrating project management...this isn't just me, it's like a lot of what I'm hearing online. (T-08)

Indeed, this sentiment is reflected throughout Australian primary and secondary schools. In a Grattan Institute survey of 5,000 Australian teachers, over 90% said they don't have enough time to prepare for effective teaching, with teachers frequently citing administrative duties as a major cause (Hunter et al., 2022). Similar results were found in a Monash University survey, adding that over 85% of teachers felt their workload was unmanageable (Longmuir et al., 2022). *Lacking home support; or pushy parents:* while schools are rich in support and resources needed for project work (T-10), this is not always the case in a student's home environment. Some children may not be able to rely on parents to have discussions or request resources regarding their projects. Conversely to a lack of support at home are parents who can be "...a bit too pushy" (T-08) regarding their child's

academic progress or involvement. Though some pushy parents mean well, they are "often described as detrimental to children" (Beauvais, 2017, p. 161).

Teaching the teacher: teachers need to master the technical skills of the project management discipline to be able to explicitly teach and assess them in children (Delle-Vergini et al., 2023b). "The more teachers are trained, the better they share that experience" (T-02) and "...best practice" (T-13). Teachers already possess some project management skills as they "...constantly manage many projects" (T-01), but they also need specific training "...with the view of teaching these skills to children" (T-09). However, our analysis revealed that project management skills are not explicitly taught to teachers in the field, nor to pre-service teachers for that matter. None of the teachers recalled any subjects or even topics on project management during their undergraduate education. This brings up an interesting question. If teachers are expected to explicitly teach project management to young children, as the Australian curriculum suggests, how can they do so if they are not explicitly taught themselves?

Finally, a significant challenge with teaching project management to children that was implicitly interwoven throughout the dataset but not explicitly articulated by teachers in our study, was the conflation of project management and project-based learning, deserving of its own theme and discussed in the next section.

Conflation of project management and project-based learning: "I think they're kind of the same"

Our second theme was not immediately evident during the interview process but became increasingly clear as we analysed the dataset. This theme was both surprising in that it was an unexpected discovery that appears to be non-existent in peer-reviewed literature, and refreshing in that it provides a unique insight into one of the barriers to effective teaching of project management to children. While project management and project-based learning share some of the same characteristics, such as a project being the centre of activity, they are differentiated by several factors, two of which will be briefly mentioned.

Firstly, in a project-based learning environment, as its name suggests, the primary purpose is an authentic learning journey for students (Kokotsaki et al., 2016) rather than the project itself (Henebery, 2020; Markula & Aksela, 2022). With project management, particularly in a work environment, the primary purpose is to successfully deliver a product, service or result (PMI, 2021a). Even ACARA (2022) agrees that project management is responsible for completing project goals that meet identified success criteria.

Secondly, with project-based learning, failure in managing the project or the product produced from that project is *not* looked upon negatively but viewed as an opportunity to learn (Project Management Institute - Northern Italy Chapter, 2015; Project Management Institute Educational Foundation, 2014). The same cannot always be said in a professional work environment. Failure in the workplace *is* looked upon negatively and can even have severe consequences for organisations and the community.

Some teachers were unsure of the difference between project management and project-based learning and sometimes responded with conflicting explanations to similar questions. T-03 said project management was "...a group of people working together for a common goal ...but um I don't know, it's hard to put into words". Later in the interview, the same participant expressed that with project management, "...I don't care how you get there, I care about the result", but with project-based learning, "...we're flipped, we don't care about the result, we care about how you get there". T-02 gave a similar response: "...I would say that [with] project-based learning...it's really a lot of learning...it's more about the process, whereas project management...you sought of know what you're looking for, for your outcomes". Others were less sure. T-05 said that: "...I think they're kind of bit of the same...there's an overlapping there". T-07 believes: "...the two go hand in hand really", while T-10 simple stated: "...I have no idea". While one teacher merged the two terms: "...the majority of our subjects have some element of project-based management" (T-07), another seemed to swap the two around:

> I would assume project management [is] a great opportunity for children to test and problem solve like their skills and sort of identify what their own strengths and weaknesses are...I feel like in project-based learning your teacher might have a habit of jumping in and trying to push them towards a specific answer...to move the project on because of you know the timelines and constraints. (T-08)

Teachers also felt it was okay to make mistakes, to fail, even when talking about project management. T-02 said: "I mean you wanna try and have a positive outcome but it's ok if you don't because you're learning. No matter what happens, you're learning". T-05 added: "...we're very big about the mistake, make the mistake." T-08 goes a step further, explaining that as teachers allow students to become more autonomous in projects: "...let them just go, even if it means failure because obviously there's learning in that". This introduces somewhat of a dilemma. If children are told that failed projects are ok, are we really setting them up to succeed in the workplace since it is viewed so negatively there? Figure 2 highlights the main differences between project management and project-based learning.

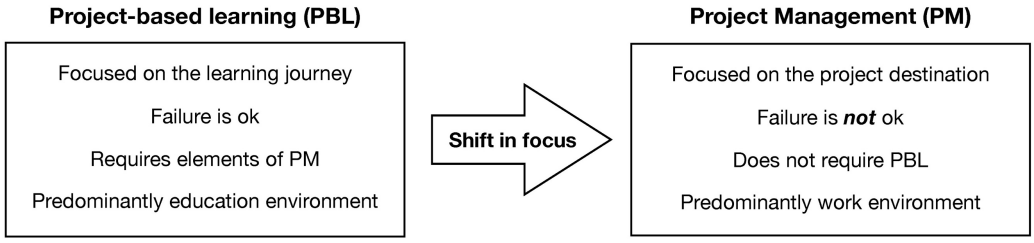


Figure 2: Key differences between project management and project-based learning

Project-based learning success is about the learning itself, while project management success "...is measured by product and project quality, timelines, budget, customer satisfaction, and achievement of intended outcomes" (PMI, 2021a, p. 224). For success in the future workforce, students learning about project management need to understand the

importance of these elements and their role in delivering successful project outcomes. That is not to say project-based learning should be replaced with project management teaching in primary school, or that in the initial teaching of project management, failure and mistakes should be actively discouraged. However, if project management best practice is the standard educators are aiming for, as is the case throughout the *real world* and in organisations that students will work for in the future, primary school students would benefit from the outcomes-based perspective that project management offers. As such, we concur with ACARA's recommendation that students should "undertake projects where the focus is [solely] on project management" (ACARA, 2020, p. 13).

Preparing educators to teach project management in primary school; not just "lip service"

Teachers suggested a range of possible solutions for preparing to teach children about project management. *Undergraduate education:* a teacher usually starts their journey at university while enrolled in an education degree. As some of our participants revealed, they are not taught a dedicated project management unit at university, or even as a topic within another subject. By incorporating it into teaching degrees, instead of just paying "...lip service to it" (T-03), it would teach "...important skills to pre-service teachers that will help them through their own careers and then also include ...a lens where you could use this to help teach your student ...but I think having a whole unit in a compact degree may not be the...greatest priority" (T-08). Further, "...more placement time" (T-02) at schools will assist undergraduates to see how project management is taught in the classroom. *Professional development:* while some teachers feel they "...do too many professional developments" (T-10), T-03 said that: "...teacher PD is essential to good quality programs", especially "...with project managers" (T-09). A professional development program will give the teacher "...resources that the teacher can reflect on to remind themselves of the processes within the project management" (T-08). *Mentorship:* "...a senior teacher that has project management experience [is] always the best way to learn" (T-02). Even training only "...experienced teachers who then mentor graduate teachers" (T-03) is a great way of "... practising those skills under the guidance of an effective teacher" (T-07).

While we have discussed several ways that educators might prepare for teaching project management to children, none of these approaches will be successful until leaders promote and incorporate project management teaching into the school ethos, as pointed out by the following two teachers: "...leadership have to be behind it and actively like following through with it" (T-07). Moreover, it must be "...ingrained within a school's philosophy" (T-03).

A framework for teaching project management to children: "You gotta have a starting point"

The final theme, in many ways, is a culmination of the perceptions, challenges, and recommendations of participants for improving the teaching of project management skills to primary school children. However, with the principal investigator intimately involved in

the interview process and dataset analysis, and through their lens as a project management professional, a conceptual structure or framework was beginning to form as this theme developed. While such a framework is beyond the scope of this study and requires further research to cultivate, it is an important result borne out of this theme's journey. Some important teacher perceptions for the development of a possible future framework for teaching project management to primary school children are discussed in this section.

Simplicity

While teachers used several words to describe ways of teaching project management to children more effectively, the emphasis was that any future framework should be *simple*. Some teachers felt a template was a good start: "I'd go a template absolutely, keep it simple, ten points, ten key areas" (T-05). Others mentioned checklists, posters, or "...a general outline" (T-02). As long as it is "...simplified cos you know teaching's a bit um you know saturated with information, but if you had a simplified poster that children could look at, but the teachers could also use...[it] would be useful" (T-08).

Multiple learning environments

When children learn project management skills, the school is not the only environment in which they can learn. Our survey revealed that only six of the thirteen teachers felt the school was the best place to learn such skills. T-10 said the workplace was better; two preferred a community setting (T-08, T-12), and four teachers (T-02, T-03, T-05, T-09) selected "other". Some reasons for selecting "other" included: "School would be [the] best place to receive explicit instruction. However [the] school could do some collaborative project with the community" (T-09). T-03 believed that there should be "a range of different experiences as well as integrating different environments to provide access to a range of opportunities and experts. The best projects I have seen move out of the classroom".

Flexibility

Some teachers expressed concerns that many frameworks are too prescriptive:

> You don't want it to be too prescriptive ...there's so much prescription already, I would hate for it to be too you know ...'you have to do exactly this way', because then you lose that creative freedom ...maybe like a you know a recipe where they pick and choose. (T-02)

... or restrictive:

> I'm in two minds, I think sometimes frameworks can be quite restrictive um myself I find that a lot of these kinds of frameworks...can be limiting to a project in some ways but at the same time without that framework where is your consistency and you're already working with people that may not necessarily feel competent in project management...you gotta have a starting point. (T-03)

Scaffolding

In an educational context, scaffolding refers to the process of intervention whereby a more experienced tutor assists a "...child or novice to solve a problem, carry out a task or

achieve a goal [that is] initially beyond the learner's capacity" (Wood et al., 1976, p. 90). However, over the last few decades, scaffolding approaches have progressed from an individual tutor and novice to a more distributed approach that includes "...multiple interactions between tools, artifacts, resources, and people in the learner's environment" (Puntambekar, 2022, p. 466). While our participants used terms such as *scaffolding* and *increments*, the overriding sentiment was that a learning framework should start off "...in a simple way, adding complexity and explicit skills as we go" (T-03). The Australian Curriculum states that it also supports the use of scaffolding approaches, specifically when teaching project management to primary school children (ACARA, 2020). These scaffolding approaches will need to consider project management activities that are appropriate for the level of development of the student while in primary school, but also as they transition into secondary school, where they will "work more independently of the teacher" (Fleer, 2016, p. 233) and be introduced to more advanced project management concepts. Some examples of project management learning in secondary school include Garfein & Noeldner (2011), Morgan et al. (2013), and Dawbin et al. (2021).

Multi-disciplinary collaboration

One of the most important factors in the development of a future learning framework would be the involvement of both educators and project management professionals. All but one of the teachers believed that both are required, citing that "teachers have the ability and means to model by example [the] management of a project" (T-07). However, due to the complexity of the project management discipline, and to ensure that the most critical components required to maximise project success are included in a learning framework, it is imperative that project management professionals are included in the process. T-06 said that "experts in the field would be best in developing a sequential framework with teacher feedback". T-03 agrees that "...both should collaborate ...to get the best outcomes".

In summary, if educators and project management professionals collaborate to develop a learning framework that simplifies complex project management technical skills and concepts, and schools incorporate project management learning into their ethos, young children will be able to experience the vast opportunities that come with learning and applying comprehensive project management skills within education and in their working and everyday lives.

Limitations and recommendations

There were several limitations that impacted this study. Firstly, while reflexive thematic analysis was an appropriate method for exploring the topic, it would have been helpful for a project management professional, such as the principal investigator, to observe project management activity in the primary school classroom. Due to time constraints, a lag in curriculum delivery resulting from the Covid-19 pandemic, and reluctance on behalf of the schools that we approached, in-class observation was not possible. This presents an opportunity to conduct future observational research, such as longitudinal and case studies. Secondly, despite a concerted effort being made to solicit participants for the

study, only thirteen ultimately took part from a pool of approximately eight hundred prospects, representing a 1.6% acceptance rate. Further, all the participants were female and from only three Australian States. While every effort was made for adequate representativeness using defined selection criteria, a larger cohort of both schools and participants may reveal additional insights unexplored in this study.

Finally, the use of *NVivo* became a little troublesome as the research progressed, particularly during theme development toward the end of the analysis phase. The researcher felt a level of disconnection with the data that was less evident when using more traditional forms of thematic analysis procedures in the past, such as whiteboards, sticky notes, and coloured highlighters. According to Maher et al. (2018), who experienced a similar disconnection when using *NVivo*, these manual forms of analysis allow for a more meaningful engagement with the data and, ultimately, the coding and thematic process. However, the authors acknowledge that software packages, such as *NVivo*, provide superior data management and retrieval options.

The sole recommendation from this study is a call to researchers, educators and project management professionals to collaborate on developing a simple project management learning framework that can assist teachers in instructing young children in complex project management technical skills and concepts.

Conclusion

Projects are pervasive in all sectors of society. They are also utilised in children's education as an instructional method for authentic learning. All projects need to be managed by capable individuals with the knowledge and skills to successfully manage a project from beginning to end. However, to date, the education and training of comprehensive project management skills have mostly been reserved for the adult population, as evident by the lack of empirical studies on children learning project management in school. Our study demonstrated that while children learn some elements of project management, it is hardly comprehensive enough to manage even a simple project from beginning to end. They also face a number of challenges, including different learning styles, varied personalities and capabilities, lack of home support, pushy parents, and limitations with language.

From a teaching perspective, although the Australian Curriculum expects teachers to explicitly teach project management to their students, they do not receive instruction in project management as undergraduates, are burdened by administrative tasks that consume project management learning opportunities, and often conflate project management with project-based learning. While teachers are still best placed to provide project management instruction to their students, they require a simple, flexible, and scaffolded framework for teaching complex project management skills and concepts to young children. They also agree that collaborating with project management professionals is the best way to develop such a framework. Despite the challenges and shortcomings of the state of project management teaching in Australian primary schools, children have a unique opportunity to put their best foot forward in the twenty-first century by learning a

multi-faceted discipline that they can use to successfully manage and deliver their most important projects at school, home, work, and in their personal lives.

References

ACARA (Australian Curriculum, Assessment and Reporting Authority) (2012). *The Shape of the Australian Curriculum: Technologies*. http://docs.acara.edu.au/resources/Shape_of_the_Australian_Curriculum_-_Technologies_-_August_2012.pdf

ACARA (2015). *Guide to understanding ICSEA (Index of Community Socio-educational Advantage) values*. https://docs.acara.edu.au/resources/Guide_to_understanding_icsea_values.pdf

ACARA (2020). *Digital Technologies in Focus. Teaching and supporting project management in the classroom F-6*. https://www.australiancurriculum.edu.au/media/6640/project-management-f-6.pdf

ACARA (2022). *Australian Curriculum: Technologies: Foundation Year, Year 1, Year 2, Year 3, Year 4, Year 5, Year 6*. (Version 8.4). [select Technologies: Foundation Year, Year 1, Year 2, Year 3, Year 4, Year 5, Year 6, and one or more curriculum elements]. https://www.australiancurriculum.edu.au/download?view=f10

ACARA (2023). *Digital Technologies in focus DTiF project*. https://www.acara.edu.au/curriculum/foundation-year-10/learning-areas-subjects/technologies/digital-technologies-in-focus-dtif-project

ACARA (2024). *Key ideas: Project management*. https://www.australiancurriculum.edu.au/f-10-curriculum/technologies/key-ideas/

Alvarenga, J. C., Branco, R. R., Guedes, A. L. A., Soares, C. A. P. & e Silva, W. d. S. (2019). The project manager core competencies to project success. *International Journal of Managing Projects in Business*, 13(2), 277-292. https://doi.org/10.1108/ijmpb-12-2018-0274

Beauvais, C. (2017). An exploration of the 'pushy parent' label in educational discourse. *Discourse: Studies in the Cultural Politics of Education ,* 38(2), 159-171. https://doi.org/10.1080/01596306.2015.1064098

Behar-Horenstein, L. S. (2018). Qualitative research methods. In B. B. Frey (Ed.), *The SAGE encyclopedia of educational research, measurement, and evaluation* (Vol. 4). SAGE. https://doi.org/10.4135/9781506326139

Bloomberg, L. D. & Volpe, M. (2019). *Completing your qualitative dissertation: A road map from beginning to end* (4th ed.). Sage Publications.

Bonner, D. (2021). *Project management for banks*. Business Expert Press. https://www.businessexpertpress.com/books/project-management-for-banks/

Braun, V. & Clarke, V. (2022). *Thematic analysis: A practical guide*. SAGE. https://us.sagepub.com/en-us/nam/thematic-analysis/book248481

Braun, V., Clarke, V., Hayfield, N., Davey, L. & Jenkinson, E. (2023). Doing reflexive thematic analysis. In S. Bager-Charleson & A. McBeath (Eds), *Supporting research in counselling and psychotherapy*. Palgrave Macmillan, Cham (pp. 19-38). https://doi.org/10.1007/978-3-031-13942-0_2

Braun, V., Clarke, V., Hayfield, N. & Terry, G. (2019). Thematic analysis. In P. Liamputtong (Ed.), *Handbook of research methods in health social sciences* (pp. 843-860). Springer. https://doi.org/10.1007/978-981-10-5251-4_103

Buck Institute for Education (n.d.). *What is PBL?* Buck Institute for Education. https://www.pblworks.org/what-is-pbl

Chen, H., Park, H. W. & Breazeal, C. (2020). Teaching and learning with children: Impact of reciprocal peer learning with a social robot on children's learning and emotive engagement. *Computers & Education*, 150, article 103836. https://doi.org/10.1016/j.compedu.2020.103836

Chiu, Y. C. (2010). *An introduction to the history of project management: From the earliest times to A.D.1900*. Eburon Academic Publishers. https://books.google.com.au/books/about/An_Introduction_to_the_History_of_Projec.html?id=osNrPO3ivZoC&redir_esc=y

Cimatti, B. (2016). Definition, development, assessment of soft skills and their role for the quality of organizations and enterprises. *International Journal for Quality Research,* 10(1), 97-130. https://doi.org/10.18421/IJQR10.01-05

Creswell, J. W. & Guetterman, T. C. (2019). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research* (6th ed.). Pearson Education. https://www.pearson.com/en-us/subject-catalog/p/educational-research-planning-conducting-and-evaluating-quantitative-and-qualitative-research/P200000000920/9780136874416

Damico, J. S. (2019). Constructivism. In J. S. Damico & M. J. Ball (Eds.), *The SAGE encyclopedia of human communication sciences and disorders* (Vol. 4, pp. 479-484). SAGE. https://doi.org/10.4135/9781483380810

Dawbin, B., Sherwen, M., Dean, S., Donnelly, S. & Cant, R. (2021). Building empathy through a design thinking project: A case study with middle secondary schoolboys. *Issues in Educational Research,* 31(2), 440-457. https://www.iier.org.au/iier31/dawbin.pdf

Delle-Vergini, S., Eacersall, D., Dann, C., Ally, M. & Chakraborty, S. (2023a). Teaching project management to children in primary school: A scoping review. *Australian Educational Researcher,* online first. https://doi.org/10.1007/s13384-023-00627-7

Delle-Vergini, S., Ally, M., Eacersall, D., Dann, C. & Chakraborty, S. (2023b). Teaching project management to primary school children: Exploring the perspectives of project practitioners. *Issues in Educational Research,* 33(1), 41-70. http://www.iier.org.au/iier33/delle-vergini.pdf

Fleer, M. (2016). *Technologies for children*. Cambridge University Press. [2nd. ed.] https://www.cambridge.org/highereducation/books/technologies-for-children/12e1feb54c0de17b5dde612cd41181ec#overview

Garfein, S. J. & Noeldner, J. (2011). *Washington State breakthrough: Project management for high school students*. Project Management Institute. https://www.pmi.org/learning/library/project-management-high-school-curriculum-6187

Henebery, B. (2020). Why high-quality project-based learning is a game-changer. *The Educator,* 23 June. https://www.theeducatoronline.com/k12/news/why-highquality-projectbased-learning-is-a-gamechanger/272021

Hunter, J., Sonnemann, J. & Joiner, R. (2022). *Making time for great teaching: How better government policy can help*. Grattan Institute. https://grattan.edu.au/wp-

content/uploads/2022/01/Making-time-for-great-teaching-how-better-government-policy-can-help-Grattan-Report.pdf

Jones, W. K. (2017). Project-based learning. In K. Peppler (Ed.), *The SAGE encyclopedia of out-of-school learning*. SAGE. https://doi.org/10.4135/9781483385198.n242

Kerzner, H. (2022). *Project management: A systems approach to planning, scheduling, and controlling* (13th ed.). Wiley. https://www.wiley.com/en-us/Project+Management%3A+A+Systems+Approach+to+Planning%2C+Scheduling%2C+and+Controlling%2C+13th+Edition-p-9781119805373

Kokotsaki, D., Menzies, V. & Wiggins, A. (2016). Project-based learning: A review of the literature. *Improving Schools,* 19(3), 267-277. https://doi.org/10.1177/1365480216659733

Konstantinou, E. (2015). Professionalism in project management: Redefining the role of the project practitioner. *Project Management Journal,* 46(2), 21-35. https://doi.org/10.1002/pmj.21481

Kozak-Holland, M. (2011). *The history of project management*. Multi-Media Publications.

Leung, L. (2015). Validity, reliability, and generalizability in qualitative research. *Journal of Family Medicine and Primary Care,* 4(3), 324-327. https://doi.org/10.4103/2249-4863.161306

Lippman, L. H., Ryberg, R., Carney, R. & Moore, K. A. (2015). *Key "soft skills" that foster youth workforce success: toward a consensus across fields*. Child Trends, Inc. https://www.youthpower.org/sites/default/files/YouthPower/resources/Workforce_Connections_Key_Soft_Skills_and_Appendices.pdf

Longmuir, F., Gallo Cordoba, B., Phillips, M., Allen, K. A. & Moharami, M. (2022). *Australian teachers' perceptions of their work in 2022*. Monash University. https://www.monash.edu/__data/assets/pdf_file/0008/3061169/Teachers-Perceptions-of-their-Work-2022.pdf

Lu, S.-Y., Lo, C.-C. & Syu, J.-Y. (2021). Project-based learning oriented STEAM: The case of micro–bit paper-cutting lamp [Article]. *International Journal of Technology and Design Education*, 32, 2553-2575. https://doi.org/10.1007/s10798-021-09714-1

Maher, C., Hadfield, M., Hutchings, M. & de Eyto, A. (2018). Ensuring rigor in qualitative data analysis: A design research approach to coding combining NVivo with traditional material methods. *International Journal of Qualitative Methods,* 17, 1-13. https://doi.org/10.1177/1609406918786362

Marin-Zapata, S. I., Román-Calderón, J. P., Robledo-Ardila, C. & Jaramillo-Serna, M. A. (2021). Soft skills, do we know what we are talking about? *Review of Managerial Science,* 16(4), 969-1000. https://doi.org/10.1007/s11846-021-00474-9

Markula, A. & Aksela, M. (2022). The key characteristics of project-based learning: How teachers implement projects in K-12 science education. *Disciplinary and Interdisciplinary Science Education Research,* 4, article 2. https://doi.org/10.1186/s43031-021-00042-x

Morgan, J., Zhan, W. & Leonard, M. (2013). K-12 project management education: NASA HUNCH projects. *American Journal of Engineering Education,* 4(2), 105-118. https://files.eric.ed.gov/fulltext/EJ1057054.pdf

Olmos-Vega, F. M., Stalmeijer, R. E., Varpio, L. & Kahlke, R. (2023). A practical guide to reflexivity in qualitative research: AMEE Guide No. 149. *Medical Teacher,* 45(3), 241-251. https://doi.org/10.1080/0142159X.2022.2057287

Ozuem, W., Willis, M. & Howell, K. (2022). Thematic analysis without paradox: Sensemaking and context. *Qualitative Market Research,* 25(1), 143-157. https://doi.org/10.1108/QMR-07-2021-0092

Padalkar, M. & Gopinath, S. (2016). Six decades of project management research: Thematic trends and future opportunities. *International Journal of Project Management,* 34(7), 1305-1321. https://doi.org/10.1016/j.ijproman.2016.06.006

Pecore, J. L. (2015). From Kilpatrick's project method to project-based learning. In M. Y. Eryaman & B. C. Bruce (Eds.), *International handbook of progressive education* (pp. 155-171). Peter Lang Publishing. https://www.peterlang.com/document/1051632

Phye, G. D. (1997). Epilogue: Classroom learning, looking ahead. In G. D. Phye (Ed.), *Handbook of academic learning: Construction of knowledge*. Academic Press. https://books.google.com.au/books?id=sTqGi21JALQC

PMI (Project Management Institute) (2017). *A guide to the project management body of knowledge: PMBOK guide* (6th ed.).

PMI (2021a). *A guide to the project management body of knowledge: PMBOK guide* (7th ed.). https://www.pmi.org/pmbok-guide-standards/foundational/pmbok

PMI (2021b). *Talent gap: Ten-year employment trends, costs, and global implications*. https://www.pmi.org/-/media/pmi/documents/public/pdf/learning/career-central/talent-gap-report-2021-finalfinal.pdf

Pomelov, V. B. (2021). The William Heard Kilpatrick's Project Method: On the 150th anniversary of the American educator. *Perspectives of Science and Education*, 52(4), 436-447. https://doi.org/10.32744/pse.2021.4.29

Project Management Institute Educational Foundation (2014). *21st century skills map: Project management for learning*. https://studylib.net/doc/8791387/21st-century-skills-map-%E2%80%93-project-management-for-learning

Project Management Institute - Northern Italy Chapter (2015). *Project management kit for primary school: Practice guide for school teachers*. https://pmi-portugal.org/wp-content/uploads/2020/01/PMIEF-project-management-kit-for-primary-school-practice-guide-for-school-teachers.pdf

Punch, K. F. & Oancea, A. (2014). *Introduction to research methods in education* (2nd ed.). SAGE Publications. https://us.sagepub.com/en-us/nam/introduction-to-research-methods-in-education/book239756

Puntambekar, S. (2022). Distributed scaffolding: Scaffolding students in classroom environments. *Educational Psychology Review*, 34(1), 451-472. https://doi.org/10.1007/s10648-021-09636-3

Richardson, G. L. & Jackson, B. M. (2019). *Project management theory and practice* (3rd ed.). CRC Press. https://www.routledge.com/Project-Management-Theory-and-Practice-Third-Edition/Richardson-Jackson/p/book/9781032476100

Sabnis, S. V. & Newman, D. S. (2023). Epistemological diversity, constructionism, and social justice research in school psychology. *School psychology Review,* 52(5), 625-638. https://doi.org/10.1080/2372966X.2022.2094283

Saldana, J. (2016). *The coding manual for qualitative researchers* (3rd ed.). SAGE Publications. [4th ed.] https://us.sagepub.com/en-us/nam/the-coding-manual-for-qualitative-researchers/book273583

Saunders, M., Lewis, P. & Thornhill, A. (2023). *Research methods for business students* (9th ed.). Pearson. https://www.pearson.com/store/p/research-methods-for-business-students/P200000010080/9781292402727

Torres, M. F., Flores, N. & Torres, R. T. (2020). Fostering soft and hard skills for innovation among informatics engineering students: An emancipatory approach. *Journal of Innovation Management,* 8(1), 20-38. https://doi.org/10.24840/2183-0606_008.001_0004

Turner, R., Pinto, J. & Bredillet, C. (2012). The evolution of project management research: The evidence from the journals. In P. W. G. Morris, J. K. Pinto & J. Söderlund (Eds.), *The Oxford handbook of project management* (pp. 65-106). Oxford University Press. https://academic.oup.com/edited-volume/42046

Velasco, E. (2022). Inclusion criteria. In B. B. Frey (Ed.), *The SAGE encyclopedia of research design* (2nd ed., Vol. 4, pp. 684-685). SAGE. https://doi.org/https://doi.org/10.4135/9781071812082

Wood, D., Bruner, J. S. & Ross, G. (1976). The role of tutoring in problem solving. *Journal of Child Psychology and Psychiatry,* 17(2), 89-100. https://doi.org/10.1111/j.1469-7610.1976.tb00381.x

Yin, R. K. (2018). *Case study research and applications: Design and methods* (6th ed.). SAGE.

Young, M. (Ed.) (2017). *People and places in project management research*. Cambridge Scholars Publishing. https://cambridgescholars.com/product/978-1-4438-4362-1

Young, M. & Pasian, B. (Eds.) (2015). *Project management research: Asia-Pacific perspectives*. Cambridge Scholars Publishing. https://www.cambridgescholars.com/product/978-1-4438-8382-5

Appendix A: Participant recruitment process

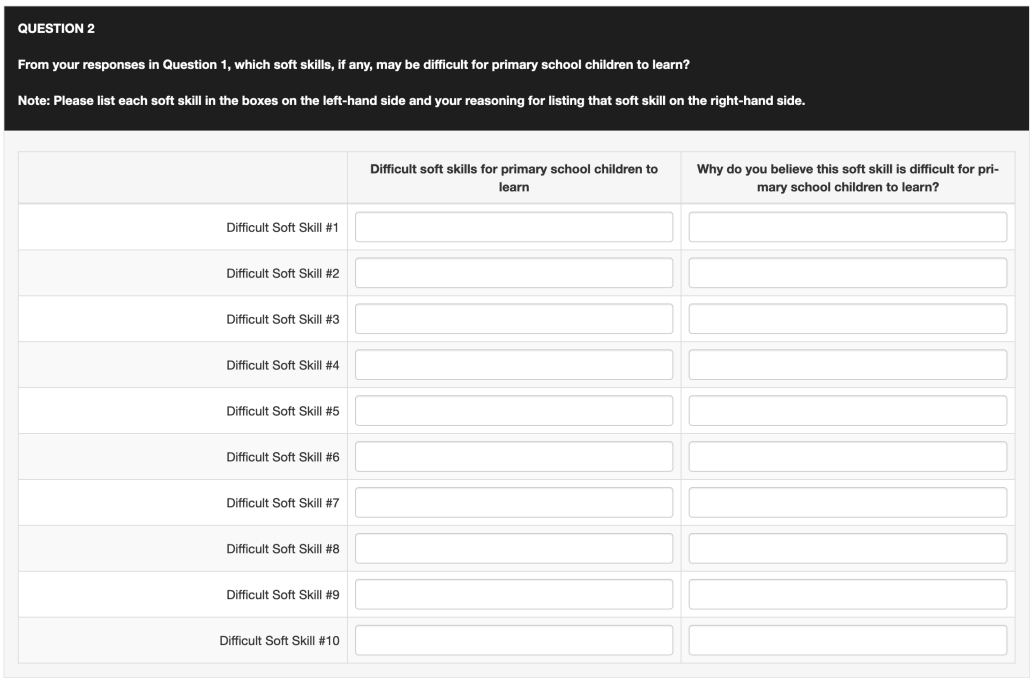
The research team contacted approximately seventy-five schools over two months. Only two schools agreed to participate. The research team sent a consent form and participant information sheet to both schools containing an online survey link with a request for a follow-up optional interview. Five teachers across both schools agreed to participate in the survey, and three of these agreed to be interviewed. As the criteria in Table 1 were still not met, the principal investigator decided to use *LinkedIn* to solicit participants. A search for "primary school teacher" was performed in the *LinkedIn* search engine, producing over 1,000 profiles. Of these, approximately eight hundred were sent invitation requests (see below), as the remaining profiles did not appear to be primary school teachers. Over the next few months, the principal investigator was in direct communication with approximately thirty teachers, eight of whom agreed to participate, bringing the total number of those who agreed to participate in the study to thirteen. Since the selection criteria were also met at that point, no further search was conducted.

Invitation script

Hello <NAME>. I am completing a PhD about teaching project management to children. It's been really difficult to find teachers for the survey (15 minutes) and optional interview (30 minutes). If you have time for one or both, I would really appreciate it. I can send you more information about the survey and a link to participate if you are interested. Thanks.

Appendix B: Survey questions

1. Soft skills may be defined as "...a broad set of skills, competencies, behaviours, attitudes, and personal qualities that enable people to effectively navigate their environment, work well with others, perform well, and achieve their goals" (Lipmann et al., 2015, p. 15) [see References below]. As a teacher, please list up to 10 soft skills that you believe are important for children to successfully manage a project from beginning to end.
2. From your responses in Question 1, which soft skills, if any, may be difficult for primary school children to learn? Please list each soft skill in the boxes on the left-hand side and your reasoning for listing that soft skill on the right-hand side.



QUESTION 2

From your responses in Question 1, which soft skills, if any, may be difficult for primary school children to learn?

Note: Please list each soft skill in the boxes on the left-hand side and your reasoning for listing that soft skill on the right-hand side.

	Difficult soft skills for primary school children to learn	Why do you believe this soft skill is difficult for primary school children to learn?
Difficult Soft Skill #1		
Difficult Soft Skill #2		
Difficult Soft Skill #3		
Difficult Soft Skill #4		
Difficult Soft Skill #5		
Difficult Soft Skill #6		
Difficult Soft Skill #7		
Difficult Soft Skill #8		
Difficult Soft Skill #9		
Difficult Soft Skill #10		

Figure B1: Screenshot of survey question #2
(use 'zoom in' function of web or PDF reader to view)

3. From your responses in Question 1, which soft skills, if any, would NOT be difficult for primary school children to learn? Please list each soft skill in the boxes on the left-hand side and your reasoning for listing that soft skill on the right-hand side.
4. Should primary school children learn how to manage projects?
   Yes No Undecided
   After making your selection, please explain your reasoning for that choice in the box on the right-hand side.

5. When should children FIRST learn about managing projects?
   0-4 years 5-11 years 12-17 years
   After making your selection, please explain your reasoning for that choice in the box on the right-hand side.
6. If you selected 5-11 years old in the previous question, which Year level or band should primary school children FIRST learn how to manage a project?
   F-2 3-4 5-6
   After making your selection, please explain your reasoning for that choice in the box on the right-hand side.
7. Who is the best person to teach primary school children about managing projects?
   Teacher PM Expert Parent
   After making your selection, please explain your reasoning for that choice in the box on the right-hand side.
8. Which group is best to develop a learning framework for teaching primary school children how to manage projects?
   Teacher PM Expert Both
   After making your selection, please explain your reasoning for that choice in the box on the right-hand side.
9. Should the person teaching children how to manage projects receive project management training themselves?
   Yes No
   After making your selection, please explain your reasoning for that choice in the box on the right-hand side.
10. What is the best environment for children learning how to manage projects?
    School Home Community Workplace Other (specify)
    After making your selection, please explain your reasoning for that choice in the box on the right-hand side.
11. If primary school children learn how to manage projects, do you believe this will help them to be more successful in their future employment?
    Yes No
    After making your selection, please explain your reasoning for that choice in the box on the right-hand side.
12. If primary school children learn how to manage projects, do you believe this will help them to be more successful in their personal lives?
    Yes No
    After making your selection, please explain your reasoning for that choice in the box on the right-hand side.
13. Technical or hard skills may be defined as the necessary abilities to perform a particular task or activity (Cimatti, 2016) and requires a high degree of domain-specific knowledge (Torres et al., 2020) and technical expertise (Marin-Zapata et al., 2021). For primary school children learning how to manage projects, which skills are more important to focus on?
    Soft Skills Hard Skills Both are equally important
    After making your selection, please explain your reasoning for that choice in the box on the right-hand side.
14. If there are any final comments you wish to add, please do so in the box below.

References (listed in the online survey)
(Also added to References section above)

Cimatti, B. (2016). Definition, development, assessment of soft skills and their role for the quality of organizations and enterprises. *International Journal for Quality Research,* 10(1), 97-130. https://doi.org/10.18421/IJQR10.01-05

Lippman, L. H., Ryberg, R., Carney, R. & Moore, K. A. (2015). *Key "soft skills" that foster youth workforce success: toward a consensus across fields*. Child Trends, Inc. https://www.youthpower.org/sites/default/files/YouthPower/resources/Workforce_Connections_Key_Soft_Skills_and_Appendices.pdf

Marin-Zapata, S. I., Román-Calderón, J. P., Robledo-Ardila, C. & Jaramillo-Serna, M. A. (2021). Soft skills, do we know what we are talking about? *Review of Managerial Science,* 16(4), 969-1000. https://doi.org/10.1007/s11846-021-00474-9

Torres, M. F., Flores, N. & Torres, R. T. (2020). Fostering soft and hard skills for innovation among informatics engineering students: An emancipatory approach. *Journal of Innovation Management,* 8(1), 20-38. https://doi.org/10.24840/2183-0606_008.001_0004

Appendix C: Interview questions

1. What is your understanding of project management (PM)?
2. What is your understanding of project-based learning (PBL)?
3. There are many similarities between PBL and PM. For example, they both involve a project, utilise project management skills, and produce a final product or result. Do you see any differences between PBL and project management?
   3.1 If so, what are the main differences in your opinion? Strengths and weaknesses?
4. Do your students participate in project work?
   4.1 If so, what kind of activities are they involved in?
   4.2 What skills are taught?
   4.3 How do you teach them these skills?
5. If your students are involved in project work, how are the projects structured and managed?
6. What kind of project artefacts are created or utilised by students in the classroom?
7. Are your students involved in managing their own projects?
   7.1 If so, what kind of activities specifically related to managing projects are they involved in?
   7.2 What skills are taught?
   7.3 How do you teach them these skills?
8. What are your views about primary school children learning how to manage projects from beginning to end?
9. Do you see any challenges or issues with children managing their own projects?
10. What more could be done to prepare preservice teachers to teach project management skills to primary school students?
11. Should there be a learning framework to assist in the teaching of project management skills to primary school students?
    11.1 If so, what would this framework look like?

Sante Delle-Vergini is a PhD student at the University of Southern Queensland, Australia. His research interests include project management, projects in society, 21st century skills, educational technology, online curriculum design, and artificial intelligence.
ORCID: https://orcid.org/0000-0001-9762-0326
Email: sante.delle-vergini@unisq.edu.au

Dr Douglas Eacersall is a Senior Lecturer (Researcher Development and Applied AI) and Learning Advisor (Higher Degree by Research) at the University of Southern Queensland, Australia. His research interests include higher education, researcher development, applied artificial intelligence, and popular culture.
ORCID: https://orcid.org/0000-0002-2674-1240
Email: douglas.eacersall@unisq.edu.au

Dr Chris Dann is an Honorary Senior Lecturer in Curriculum and Pedagogy Digital Technology at the School of Education, University of Southern Queensland, Australia. His research interests include machine learning, student satisfaction, feedback, adult learning, online learning design, educational assessment, enacted curriculum, student retention, and artificial intelligence.
ORCID: https://orcid.org/0000-0001-7477-0305
Email: chris.dann@unisq.edu.au

Dr Mustafa Ally is an Honorary Associate Professor in Information Systems at the School of Business at the University of Southern Queensland, Australia. His research interests include cryptocurrencies, blockchain technology, online payment systems, trust and online shopping, and technology adoption.
ORCID: https://orcid.org/0000-0001-6370-3860
Email: mustafa.ally@unisq.edu.au

Dr Subrata Chakraborty is a Senior Lecturer at the University of New England. He received his PhD from Monash University. He is currently also a Visiting Fellow at the University of Technology Sydney and with Griffith University. His current research interests include data analytics, machine learning, image processing, and optimisation.
ORCID: https://orcid.org/0000-0002-0102-5424
Email: subrata.chakraborty@une.edu.au

Please cite as: Delle-Vergini, S., Eacersall, D., Dann, C., Ally, M. A. & Chakraborty, S. (2024). Exploring the perspectives of Australian primary school teachers on students learning about project management. *Issues in Educational Research*, 34(3), 928-952. http://www.iier.org.au/iier34/delle-vergini.pdf