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# The development of teacher self and collective efficacy through a research practice partnership project

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## ABSTRACT

This paper outlines the affordances provided through teacher engagement in an educational research partnership project for the development of teacher self-efficacy and collective teacher efficacy. Six teachers, previously involved in a successful two-year project, chose to commit to continuing to research and develop their practice. They agreed to focus on whole class teaching which was an area of interest for their community of schools. This qualitative study utilised audio recordings of workshops, and artefacts produced by these teachers. Data was analysed thematically. Findings show there was clear evidence of growing individual and collective teacher efficacy as teachers used common language and shared and analysed student data over time. The teachers also became more prominent in their role as teacher leaders and proactive and engaged in planning for student improvement within and across their schools. Factors that contributed to teacher self-efficacy and collective efficacy were identified. Implications for teachers and schools are discussed.

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## Introduction

Teachers' involvement in classroom-based research projects is purported to be beneficial for teacher participants as projects usually include an element of professional learning (Handscomb and MacBeath 2006, Bergmark 2020). Participation can support teachers to develop in-depth understandings of the topic under investigation and the process of educational research. Other outcomes include changes in teachers' attitudes and beliefs, changes in prioritising specific elements of their work, transformational thinking that is transferable to other contexts, and so on (Hilton and Hilton 2017, Leibovitch *et al.* 2025). However, not much attention is paid to the ongoing impact of a project once the project has been completed (Delamont 2016). Researchers tend to move on and teachers are usually left to sustain new practices as part of their daily work.

To have the confidence to sustain new practices teachers need to have a sense of efficacy. Given the importance of teacher efficacy, it is useful to consider sources of efficacy that may not be fully recognised. Such sources, if they exist, could perhaps be

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more effectively utilised to increase the self- and collective efficacy of teachers. Descriptive qualitative research that focuses on efficacy, and in particular collective efficacy, is limited and there have been calls for more to be conducted (Donohoo 2018, Preston 2022). In our work in teacher development we thought a Research-Practice Partnership (RPP) project offered a productive kind of sustained and structured set of experiences. This led to a decision to investigate the following research questions:

What impact does teacher involvement in a research practice partnership project have on the development of teacher efficacy?

What factors related to a research practice partnership contribute to the development of teacher efficacy?

The paper reports on the sustained development of teacher self- and collective efficacy as teachers participated in a two-year Research-Practice Partnership (RPP) (Edwards et al., 2022) and 1 year of self-initiated research (post-RPP), prompted by their desire to continue to research their practice given the impact of their involvement in the RPP project. It outlines and analyses the affordances provided by teacher interactions that fostered and came to rely on teacher efficacy and initiative in framing and pursuing an inquiry question relevant to their students. Researchers attended all workshops of the RPP and post-RPP over a three-year period. Qualitative data was gathered by audio recording of all the workshop activities including teacher discussions from these workshops. Some artefacts produced by the teachers were also collected.

## Teacher efficacy

Teachers' self-efficacy can be described as their sense and confidence in their abilities to perform a particular task or to achieve a goal (Bandura 1986). Those with high self-efficacy display stronger motivation, are more willing to persist and accept changes, and are more willing to introduce innovations to their teaching practice (Bandura 1977, Rubie-Davies *et al.* 2012). Eun (2019) argues that those with high levels of self-efficacy are also more likely to have a range of strategies to cope with demands and setbacks, and indeed they embrace these as opportunities for self-development.

Bandura (1977, 1986) utilised social cognitive theory in the development of self-efficacy theory. Self-efficacy relies on teachers' cognitive processes such as those of perception, attention, and memory. The ways teachers have perceived and processed their past performances and their knowledge, skill base, and situational or environmental contexts are said to be contributing factors to their perceptions of capability to perform at a certain level within a particular set of contexts or set of constraints. However, because cognitive processing is ongoing and teachers' contexts and experiences are not fixed but constantly changing, their levels of self-efficacy can also change over time. That is, self-efficacy is not an innate ability or static competency. As summed up by Bandura (1997, p. 6) 'internal personal factors in the form of cognitive, affective, and biological events; behaviors; and environmental events all operate as inter-acting determinants that influence one another bidirectionally'. From a social cognitive perspective, the social interactions within a social group can help develop self-efficacy (Yang 2020). Extending the social cognitive frame also allows for consideration of the development of joint efficacy within groups of teachers, or collective efficacy.

Collective efficacy has been defined as ‘a group’s shared belief in its conjoint capabilities to organise and execute the courses of action required to produce given levels of attainments’ (Bandura 1977, p. 477). This means that efficacious teams see strength in the group and therefore value collaboration and teamwork. Bandura (2000) further noted that ‘the higher the perceived collective efficacy, the higher the groups’ motivational investments in their undertakings, the stronger their staying power in the face of impediments and setbacks, and the greater their performance accomplishments’ (p. 78). In a school context, collective teacher efficacy is developed by teams of teachers who believe in their joint ability to influence student learning. Hattie (2023) notes that collective teacher efficacy is grounded in a shared language about learning and impact rather than simply shared ways of teaching, and that teachers’ perceptions such as “We are evaluators”, “We are change agents”, and “We collaborate” (p. 228) influence the actions of those teachers.

Four sources of past experiences have been identified as contributing to efficacy: mastery experiences, vicarious experiences, verbal persuasion, and affective states (Bandura 1977, 1998). Bandura hypothesised that a sense of mastery is developed through individuals’ previous experiences with success or failure in specific tasks. Mastery experiences mean that people are more likely to take on tasks in which they feel competent and tend to avoid activities they perceive as too challenging. These are most influential on teachers because they depend on the teacher-group’s own performances and perceived capabilities as they observe the evidence of student improvement, allowing teachers to see evidence of their impact (Hattie 2023). The second source of efficacy, vicarious experiences, suggests that people’s efficacy is influenced by observing the experiences of important others. Vicarious experiences mean that when teachers can see student improvement through the work of others this gives them some assurance that they could also find success in similar ways.

Bandura’s third source, verbal persuasion, posits that an individual’s confidence in their ability to achieve or fail in a task is significantly shaped by the verbal feedback they receive from others. Teams of people can also be talked into believing that they can do what earlier was too difficult for them. This involves the development of a sense of shared vision. The fourth and final source of efficacy, affective states, involves the physical and emotion states that individuals use to assess their own capabilities, strengths and limitations. Moderate levels of physiological and emotional arousal can serve as motivation, but according to Bandura intense or overwhelming physiological or emotional responses may negatively affect a person’s sense of self-efficacy. Similarly, teaching teams are more likely to expect success when they experience the positive feelings resulting from students making progress due to their input (Timperley 2008).

### **Relationship between individual and collective efficacy**

Individual teacher efficacy focuses on the teacher’s beliefs in their own abilities, whereas collective teacher efficacy focuses on groups of teachers’ beliefs about the competencies of their group as a collective. In considering these two types of efficacies, those utilising social cognitive theory would suggest that there is a reciprocal relationship between the two. That is, teachers are influenced by the groups in which they work but they also influence these groups (Bandura 1997, 2001, Ninković and Knežević Florić 2018).

However, collective efficacy is not simply the sum of the self-efficacy of the group's members (Bandura 2001). Studies have shown a reciprocal causal relationship in that when people with high efficacy work with peers who are confident, together they tend to develop a positive sense of their collective efficacy (Goddard and Goddard 2001, Wu *et al.* 2010).

Perceived efficacy beliefs have been found to play a role in human motivation and decision-making about actions (Bandura 1997). Additionally, efficacy beliefs affect the holder's goals and aspirations, behaviours, inclinations, levels of commitment, and perceptions of possible impediments or opportunities (Bandura 2000). Not surprisingly then, both individual self-efficacy and teacher collective efficacy have been found to be important to teacher action and student learning (Kim and Seo 2018, Hattie 2023). The effect of perceived collective teacher efficacy was found by Bandura (1993) to have a strong link to student achievement, stronger for example, than the obvious factor of socioeconomic status. This effect raised interest from following researchers, who have found evidence of such a link (e.g. Goddard *et al.* 2000, Ramos *et al.* 2014). In his meta-analysis Hattie (2023) has ranked collective teacher efficacy as having the highest influence of all factors identified related to student achievement.

## Context

The study reported in this paper was undertaken during and following teacher involvement in a 2-year RPP-funded project: *Zooming out and zooming in on student data: Developing teacher data literacy to enhance teaching and learning* (Edwards *et al.* 2022). The RPP project involved 13 teachers from 7 schools in the same geographical area in New Zealand. All teachers taught fully comprehensive elementary/middle school programmes, covering all curriculum areas. Through the RPP project teachers learnt about data analysis, analysed their class data, planned an intervention based on their analysis which ran for several iterations and reported their progress to colleagues. They also took on the role of colleague coach and worked with a teacher/s from their own school to develop their data literacy capacity (Edwards *et al.* 2022). At the conclusion of the RPP project six teachers from five different schools decided to collaborate for a further year (the Post-RPP year) and these are the participants reported on in this paper. All six teachers had at least 10 years teaching experience. Two worked in a school in a rural town and four worked in nearby rural primary schools (Year 1–8).

During the Post-RPP year there was no pre-set research agenda, and teachers were keen to 'set their own path'. Two university researchers from the RPP project volunteered to remain connected to the group in an advisory capacity. When they initially met as a group in the Post-RPP year the teachers decided that a focus on whole-class teaching of mathematics would be worthwhile. Each teacher then decided on a specific inquiry focus for themselves. Throughout the Post-RPP year the teachers and researchers met together twice each school term i.e. eight times throughout the year. At these workshops, experiences and resources were shared through teacher report-back. The university researchers acted mostly as observers, although they were sometimes active in the teacher discussions. However, the teachers themselves set the agenda and directed their own work.

Ethical approval for this Post-RPP research was granted by the University of Waikato. Ethical consent was gained from all participants. Teachers' names are not used in the data that is reported. Instead, Teacher A, B etc is used to denote individual participants' contributions.

## Data collection and analysis

This is a qualitative study utilising audio recordings of workshops from the RPP project and the Post-RPP year. Every workshop within these projects included teacher report back of their activities since the last workshop, joint planning for ongoing teaching, and teacher discussions of strengths and weaknesses of current and potential teaching approaches. Researchers were present during the workshops and from time to time they posed questions so that teachers could clarify their thoughts. Each whole workshop was audio recorded through the placement of three audio recorders around the room. Recording from three places in the room provided clear coverage of all audio. Additionally, teachers provided the researchers with artefacts (PowerPoints and reflections they had written in preparation for the workshops). Sections of the workshop recordings pertinent to the research question for this study were transcribed.

All data was analysed thematically using the phases of thematic analysis outlined by Braun and Clarke (2006), and elements that represented teacher efficacy were identified. The data was read and reread, and initial impressions, recurring ideas and interesting points were noted. The data was grouped into chunks of meaning, coded, and clustered with other related ideas. From these broader categories, two main themes were identified: teacher self-efficacy and collective efficacy. Coding was completed inductively to see what the data produced as opposed to fitting it to a pre-existing understanding of the development of efficacy.

## Findings

The findings section is structured according to two main themes: teacher self-efficacy, and collective efficacy. Following this, the findings relating to factors that contributed to the development of efficacy are described.

### *Teacher self-efficacy*

Teachers' descriptions of their self-efficacy are outlined under two themes: confidence in sharing and exploring new teaching approaches, and confidence to lead.

### *Confidence in sharing and exploring new teaching approaches*

Throughout the RPP project teachers noticed their confidence grow. They felt they moved from being everyday classroom teachers to having specialised knowledge and experiences. For example, Teacher A reflected that as she tried out new strategies and reported back on her students' progress her personal confidence grew:

It increased my confidence in how I teach and what I know. Led me to be more confident and be able to question and challenge others' ideas. I was a quiet mouse in the corner when the study started. (Teacher A)

Teacher A became willing to experiment with new teaching approaches and to share her findings with others. Later in the project she also stepped up into a leadership position within the group, thereby demonstrating increased levels of confidence in insights she could share with peers.

Teacher B also acknowledged her increasing efficacy, and she linked this to developing clearer focus with specific goals for action on data during the RPP. The structure of the RPP, which involved teachers identifying and discussing classroom actions and reporting to the group on these, helped her set goals and then find success. At the end of the Post-RPP year she commented:

I believe my self-efficacy has increased over the last years. I feel far more confident to take an idea and give it a go, but with a clear goal in mind. (Teacher B)

During the RPP, teachers developed confidence to share their teaching approaches, became less worried about what others would think about their teaching, and more willing to take risks by innovating their practice. During the Post-RPP year, the teachers were more independent in their approach to their own professional decision-making; confident and assured. Teacher C acknowledged that both formal and informal processes within the RPP project were helpful and allowed for her growth.

I feel more confident to lead others, talk about our work and share ideas. This comes from having been challenged about what I am doing, talking through my thinking and spending time reflecting on my practice in a formal and informal way. (Teacher C)

Teachers became more comfortable with recounting and collectively analysing the success and challenges of the iterative inquiry projects they undertook as part of making data-informed changes. Whereas early in the RPP project the teachers were more reliant on materials provided by the researchers, by the start of the Post-RPP year they were proactive and confident in sourcing and developing materials for themselves. Teachers shared books, useful websites, readings, and webinars that they had sourced independently. They spoke confidently at the Post-RPP workshops about their inquiry foci and what teaching approaches they were trialling in their classes.

Early in the RPP teachers were reserved about sharing negative experiences with the group. However, post-RPP, the teachers showed resilience and were not ashamed or embarrassed to share negative implementation stories. For example, in one workshop Teacher E described her realisation that the whole class method she was using to teach word problems involving fractions was not working. She recounted this insight to the group:

And I know that I've been using some tools . . . and some resources so that some of my kids are getting to the stage where they are able to do word problems . . . and other kids are so slow that they never get there . . . . So that's something I'm going to have to do something about. (Teacher E)

In response to this admission two other teachers made suggestions based on their experiences of teaching fractions. There was no sense of personal judgement from these teachers as they were seeking to offer potential solutions rather than offer critique. Teacher C explained that the Post-RPP group provided a supportive network of peers with whom she could share concerns and seek advice. Her previous experience with these teachers meant she was confident to trust their collective knowledge.

I have come to understand that not everyone feels comfortable to be vulnerable about their practice. One of the most important things is to model that it is okay and that we all have things to learn . . . I also know I have a network of teachers who I can go to for advice and support (Teacher C)

In contrast with the earlier RPP interactions, the Post-RPP group reactions to each other's informal presentations in workshops were more forthright. They included congratulations, commiserations, raising questions, making suggestions, and admitting that some questions remained unanswered. Their discussions indicated that teachers experienced the Post-RPP group workshops as a safe space to share pedagogical insecurities, hunches, successes and failures; teachers valued openness and had confidence in sharing and exploring new teaching approaches together.

### **Confidence to lead**

Through their involvement with the RPP project, teachers claimed to have developed the confidence to lead others. Their role in the RPP project included coaching teachers in their own schools (Edwards *et al.* 2022) as a non-negotiable aspect of the project. They considered that in part their confidence to coach others derived from them having achieved success with their own inquiries into the use of data, as they were able to lead from a position of knowledge and experience. This also empowered them as teacher-leaders to play a more active role in school policy and practice in the Post-RPP year. For example, Teacher C talked about taking a lead in planning school meetings:

I have worked with our maths unit holder [school leader] to redevelop and review our school wide maths education plan. This has included coaching staff into the new model. (Teacher C)

The teachers' growing willingness to contribute to other teachers within their own schools and work with organisations outside of the project provides evidence of leadership efficacy in another dimension. For example, during the RPP project some teachers became involved in the work of New Zealand Council for Educational Research (NZCER), providing feedback on aspects of the standardised Progressive Achievement Tests (PAT) for mathematics, and this role provided ongoing kudos. Additionally, as the RPP project ended, several of the teachers presented at national and international conferences. All these elements of extra work illustrate teachers' increased confidence to provide leadership within the education sector.

## Collective efficacy

All participants identified the importance of the 'group' as a unit from which they could draw knowledge and confidence. Their discussions demonstrated their rich diversity of knowledge and experience and they were quick to acknowledge their joint commitment and responsibility for the students in their geographic region. Collective efficacy was seen to develop over time over the RPP and Post-RPP years as the teachers grew to know and trust each other and their university partners. In the RPP project they experienced collaborative professional learning and research involvement. This shared experience meant they had developed a common understanding of data literacy and a taken-as-shared understanding of what was involved in coaching colleagues. They also bonded as a group of colleagues, sharing stories, social events, and humour. The dynamic of the smaller group remained similar in the Post-RPP year. The camaraderie was strong, and teachers demonstrated a sense of joint purpose through their opportunities to learn from each other, as explained by Teacher A:

It is incredible the amount of learning I have gained from regular meetings with this group. Each time we bring a new inquiry back to discuss, it's like a whole day on a PLD course but far better. It's relatable, practical and applicable. The understandings we have gained about the different school year levels has been beneficial. (Teacher A)

In these comments we can see that not only did teachers value learning from each other; they valued the opportunity to gain insight from those working at the same and at different schooling levels.

Teachers in the Post-RPP project decided jointly to focus their inquiry work on whole-class teaching of mathematics, which was a focus of discussion and contention in the New Zealand education sector in the Post-RPP year. Teachers appreciated having the group as a sounding board as they made decisions about the nature of their particular investigations, 'working as part of a team on a common goal' (Teacher C). A sense of collective purpose continued through the Post-RPP year.

Within their implementation of whole-class teaching the group valued the variety of strategies trialled, seeing the trial results as shared achievements that gave them access to a wide range of possible teaching approaches and actions. The teachers discussed the benefits and motivation they gained from working together as highly motivated and curious teachers. For example, Teachers B and E described how they were able to bring together elements from their experiences and process them for the group's benefit:

Working alongside other motivated teachers and well-educated others, understanding and deeper reading of relevant and current research and having the time to reflect, discuss and refine both my understanding and teaching practices . . . this being able to share, listen to and value other teachers' thoughts and ideas has been super beneficial. (Teacher E)

With all the different viewpoints and ideas being shared at our meetings it means that a lot of questions that are asked at [our own] school staff/team meetings have already been discussed [by us in this RPP group]. (Teacher B)

The teachers were also asked to delivered professional development to other schools in the region, and attributed their confidence to do this to their earlier work. Through this PLD work their expertise began to be recognised by the wider teaching community. Teacher E provided commentary on this aspect of the group's actions:

As a group we have worked together to upskill . . . not only did we help ourselves as a group but were able to spread this knowledge across our school and wider [regional] schools. (Teacher E)

Similarly, Teacher C described the power and efficacy gained by the group working together, learning together, and supporting each other. Her trajectory from a teacher working alone and not having a sense of efficacy to ‘feeling connected beyond my own school’ and being confident enough to lead workshops, coach other teachers, and present materials at conferences, demonstrated the benefits of group efficacy.

Working together is one of the most powerful things teachers can do. We learn so much from each other and also have the opportunity to challenge and examine our thinking in rich and robust ways. (Teacher C)

The effects of the RPP were evident as the teachers in the Post-RPP year continued to draw strength from the knowledge they had gained and from the power of the group.

### ***Contributing factors to self-efficacy and collective efficacy***

Four key factors that contributed to efficacy were identified by teachers. These were as follows: time to allow personal reflection, university involvement, trust and fellowship, and learning from each other.

#### ***Time and structure provided to allow personal reflection***

A main identified contributor to developing teacher self-efficacy through the RPP project was the time provided to teachers to allow them to think deeply about their practice. Teachers felt that time to reflect helped them to analyse and assess the impact and value of their own actions, and led to increased confidence. Time for sharing helped them become more aware of what other teachers were doing. In the Post-RPP they continued to value and prioritise reflection and take time to share with others. The following quote illustrates the benefits that teachers gained through prioritising time set aside to think about their practice and beliefs Post-RPP:

I think that looking deeper at my own practice and how it may positively or negatively affect different learners, being very reflective, has contributed greatly. Prior to the group, I would not have reflected as deeply or with as much focus. (Teacher B)

During one of the workshops where the teachers were describing their inquiry projects Teacher C commented on the value of teachers examining their own beliefs:

I realise that not everyone has the same teaching and data values and beliefs as myself. It is important for change to happen and be sustained so that teachers have the opportunity to look at their own beliefs and values. (Teacher C)

Teachers explained that their job is very busy and they do not have the opportunity or time to think deeply about their practice. The reflection activities built into RPP project workshops required teachers to engage with their work at a deep level, e.g. when preparing presentations. In addition, they wrote short case studies and recorded video clips that summarised specific areas of their involvement (Cowie *et al.* 2024). Each of

these activities required teachers to spend time reflecting on their work which led to deeper understanding.

### *University involvement*

The formal involvement of university researchers was found to contribute to participants' efficacy. Research input from university staff during the RPP supported and scaffolded their understanding of data literacy as well as their role as coaches. The reputation of the university in their region meant they were confident about the value of the research design, and they felt they had a firm base from which to extend their work and continue their development as a credible group.

I think the biggest drive of our success was the credibility we had from working in a formal relationship with Waikato University. This opened so many doors for us. It has also given us credibility within our own context. Working with them has also ensured that we have made traction . . . as they bring credibility to our work. (Teacher C)

The researchers linked teachers to organisations such as NZCER and jointly presented with them at conferences; opportunities that as a group they would otherwise not have had. This lifted the profile of the teachers and reinforced their confidence in what they were communicating. The following quote is illustrative of the teachers' reflections on the role of university partners:

Having our university peoples' support has been truly inspirational and has added the 'grit' we needed. (Teacher D)

In the Post-RPP year, the role of university researchers shifted from providing direction to providing encouragement. The teachers themselves took control and were confident to identify and set their research agenda. Teachers appreciated the ongoing relationship with the university researchers, albeit in a more relaxed and casual manner. University involvement was therefore found to contribute to the collective efficacy of the teachers.

### *Trust and fellowship*

Teachers emphasised the importance of robust discussions about practice within a relationship of trust and mutual respect. In the following quote Teacher B identifies that her efficacy came from the positive impact of her classroom work as well as from group discussions. She also indicated she valued the informal aspects of working together, having 'a few laughs.'

The sharing of ideas to try and having robust discussion - along with a few laughs - has made me more confident to try new ideas when teaching. I have been able to listen to what others are doing and try something similar in my class and share my learning with colleagues. I have seen the positive impact of interventions and changes in instruction (Teacher B)

This teacher valued being part of a network of teachers she could trust. Teachers within this group were able to access new ideas and had the confidence to try them out, based on their colleagues' successes. Having a network of teachers they could trust at this level was empowering for them, as Teacher E explained:

I am not afraid to look up and use research to back up ideas or to explore other ideas or issues. We have a network of experts across the [area] which we now feel comfortable to contact. (Teacher E)

There appeared to be an emotional element to the way the teachers related to each other. They trusted each other professionally but had also developed a bond of friendship through their shared enterprise.

### *Learning from each other*

Teachers in this study were able to learn from each other as a group in the RPP, and that this encouraged them to innovate in their own practice. They were happy to share ideas with each other and had confidence that they all had something worthwhile to share. They learnt through vicarious experiences by openly discussing and critiquing their work, which they felt helped strengthen the group's knowledge base. The following quote illustrates their confidence in sharing with the group:

The development of collective efficacy has been great - bouncing ideas off others - so you can then interact with other colleagues with more clarity and depth as you have had this time to develop thinking and how to share key things. (Teacher D)

As an example of teachers learning from each other within the group, the following is a description of Teacher B's experience. Teacher B learnt about the use of vertical algorithms from Teacher D, who had developed a mastery understanding of the topic based on her own inquiry work. Teacher D had explained that her Year 7 students misunderstood the 'equals sign' seeing it as 'the answer' rather than equivalence. She learnt new approaches to teaching what the equals sign means from group members:

When we looked at our PAT data and we discussed a key finding of the misunderstanding of the equals sign with our Year 7 students. The teachers of junior students talked about how they could see that it was confusing for the students as they just assumed that the students understood the sign did not mean 'answer'. ... Lots of work has [now] been done around this. I now work with my students around the name of the signs and what the sign means. Eg. = is called the equals sign and it means that what is on one side must balance/is the same as with the other side. (Teacher D)

Teacher B related what she heard from within the group to her class of low achieving younger students, with a confidence gained from vicarious experiences of the group.

I definitely learnt a lot from listening to the others and their experiences. . . . I decided to try this [Teacher D's idea] with my group of learners, most of whom are in Year 6 and working at late level 1/early level 2 of the curriculum. . . . The confidence of these students has skyrocketed, the looks on their faces. (Teacher B)

Teacher B's breakthrough came from listening to her colleagues and believing that their suggestions were worth trying. The group's confidence in proposing alternative teaching strategies enabled her to try something new. As a result, her students produced better results in the summative PAT assessments, providing a positive feedback loop for Teacher B and the rest of the group members. The result is likely to further enhance Teacher B's self-efficacy as well.

## Discussion

This study examined the impact of teachers' involvement in a RPP project on the development of their efficacy and the effect of this during the Post-RPP year. The findings highlighted indicators of self and collective efficacy which led to the teachers' increasing confidence with respect to their self-directed work and group efforts. The importance of dynamic and positive social interactions within a group cannot be understated as it facilitated collaboration and efficacy, similar to the findings of Yang (2020). In this study, the RPP project provided teachers with an opportunity to build a positive group culture, and this was further developed in the Post-RPP year. This study found that group discussions provided teachers with vicarious experiences as well as verbal persuasion. As found elsewhere (Loughland and Ryan 2022), the teachers' abilities to communicate in such a way was beneficial, nurturing respect and allowing the group to gain a sense of mutual ownership. Group involvement was central to their ongoing development of group-wide trust as well as individual confidence and self-reliance.

Teachers' processing of past experiences affects self-efficacy (Bandura 1977). Tschannen-Moran and Woolfolk Hoy (2001) identified three contexts in which increased competence can lead to self-efficacy: classroom management, instructional practice, and student engagement. The teachers' RPP involvement helped them develop further expertise in instructional practice and student engagement, based on their growing in-depth understanding of student data, thereby increasing their efficacy as they saw improvement in student learning outcomes (Timperley 2008). As found in earlier studies (Rubie-Davies *et al.* 2012, Eun 2019) teachers with high self-efficacy are more willing to introduce innovations to their teaching practice and more willing to persist and accept changes. All of the teachers in this study exhibited high levels of efficacy and all were active in the use of innovations and willing to take risks in their teaching practice. Evidence showed they had become braver over time and that they used a range of teaching methods as well as using shared language (Hattie 2023).

This study highlights the relationship between individual and collective efficacy for teachers. Like findings by Goddard and Goddard (2001) and Wu *et al.* (2010), the group of teachers viewed each other as competent and confident, and together they developed a collaborative way of sharing learning experiences. The developing pool of common knowledge then acted as a resource for individuals and the group. This process led to the development of collective efficacy similar to the relationship described by other researchers such as Bandura (1997, 2001) and Ninković and Knežević Florić (2018). The Post-RPP year provided further evidence of self and collective efficacy as the group of teachers stepped beyond what they had learnt in the RPP project and used their knowledge and skills to confidently investigate further ways to improve student learning.

The evidence from this research also draws attention to the specific ways a RPP project can provide experiences that contribute to collective efficacy. There is evidence in this study of Bandura's (1977, 1998) four sources of experience that contribute to collective efficacy: mastery experiences, vicarious experiences, verbal persuasion, and affective states. Teachers gained *mastery experiences* through investigating the impact of data literacy on student achievement (Edwards *et al.* 2022) and the value of colleague coaching (Edwards *et al.* 2022). Additionally, sharing stories of their teacher inquiries provided teachers with *vicarious experiences* (Cowie *et al.* 2024) with their learning and success

further affirmed through discussion linked to research readings. The success they found through these activities in the RPP project led to a level of efficacy teachers had not previously experienced, and they were able to build further on this. In the Post-RPP year teachers referred to stories of practice and resulting positive student outcomes from their RPP project inquiries, and this appeared to drive increased confidence as they developed their own more personal inquiries. Being able to refer to previous and shared experiences highlights the potential for a structured collaborative research project to serve as a platform for this processing.

One key task within the RPP project was teacher co-construction of definitions of key terms, and a shared vision for teachers' work across their region. This included the development of a working definition for data literacy (Cowie *et al.* 2021). The commitment to developing and agreeing on a shared vision can be seen as a result of *verbal persuasion* (Bandura 1977, 1998). Rather than moving on to a new or different vision, teachers built on their work in the RPP to grow the vision. Finally, the place of *affective states* was evident in this study. Teachers shared the ups and downs of their ongoing work, and this could be seen to contribute to the collective efficacy of the group. The value of the group dynamic and the strength and confidence built through trusting and respectful relationships was also highlighted, as was the camaraderie, humour and the positive feelings that flowed from making a difference for their students. As found by Loughland and Ryan (2022), communication competence was an important element in the ongoing development of the group's collective efficacy in this study.

As well as evidence of the four sources of self-efficacy identified by Bandura (1977, 1998), this study has presented a mechanism that can act as a catalyst to the development of teacher efficacy – that of teacher involvement in a structured research project. In this study, the teachers' involvement in a research project over a considerable time period allowed them to develop new knowledge and experiences, as well as trust and learning-focused relationships with others. Together these contributed to both self- and collective efficacy for these teachers. The presence of the RPP provided a structure for collaborative work, for knowledge sharing and practical investigation along with opportunities for teachers to reflect on their practice. Individual teachers identified the practice of reflection as a key element in their learning and decision-making processes, which provided them with more surety in value and rationale for their actions, thereby increasing their efficacy. With respect to group efficacy, the RPP project provided the basis for a common purpose and vision for action. It supported the development of the team of teachers as a network across schools that deepened in the Post-RPP year as they continued to explore their joint ability to influence student learning. Teachers recognised the strength in and of the group; they valued collaboration and robust conversations. The interactive dynamics of the group members (Goddard *et al.* 2000) and their shared experiences acted to strengthen the resolve and beliefs of the group over time, further contributing to its collective efficacy. This study has illustrated the dynamic nature of efficacy and the reciprocal relationship that occurs across individuals, people, and groups affecting perceived confidence and competence (Goddard and Goddard 2001, Wu *et al.* 2010).

Researchers and school leaders would do well to recognise the possibilities for teachers' involved in research project work. In this study, RPP involvement led to a positive outcome for the teachers – that of increased efficacy. This was more than a level of self-efficacy related to the project itself. Instead, the teachers established

a broader level of confidence and a shared culture which included a sharing of responsibility for students in their region. Central to this was their shared language about data literacy and its impact, developed in the RPP (Cowie *et al.* 2021). Hattie's (2023) work demonstrates that a shared language between teachers is more critical than a shared way of teaching, and teachers' collective efficacy about their impact leads to groups that *are* more effective.

As discussed above, in this study all of Bandura's factors are relevant. The participants came together from different schools and were involved in building common understandings of data literacy, multi-school sharing of, analysis and considering action on data. The RPP provided teacher funded time to explore ideas, share and act and report on students' responses to actions based on data. These opportunities helped teachers develop what Hattie (2023) describes as skills in developing collective efficacy 'high levels of social sensitivity, high levels of turn-taking, high levels of social awareness, confidence in each other's abilities, and the belief in the impact of the team's work' (p.228). Engendering collective efficacy can be difficult but, as has been found, teacher engagement in a RPP provides affordances to the development of individual teacher self-efficacy and collective teacher efficacy. Building on the confidence and sense of empowerment from successful engagement in a RPP the teachers in this study were able to take ownership of their ongoing inquiries, presenting a bricolage of classroom practice possibilities.

## Conclusions and implications

This study has provided a rich description of factors influencing the development of teacher efficacy, both individual and collective. Teacher involvement in a research project such as an RPP can provide a catalyst for the ongoing development of teacher individual and group efficacy. As efficacy is seen as having a high influence on student achievement (Hattie 2023), this link is worth pursuing. The implication is that there is a value in supporting teachers' post-formal research project involvement as part of supporting them to become fully independent of researchers. As teachers continue to develop efficacy they will be able to contribute to the wider field of education. Their efficacy can allow teachers to:

- develop confidence and knowledge that allows them to make better founded pedagogical decisions
- be involved in a forum that facilitates the sharing and cross pollination of ideas and practices
- empower teachers with ideas and strategies to play a more active role in their school policy and practice
- take ownership of the design, conduct and reporting on of classroom inquiries
- benefit from their status as collaborative teacher leaders

This study has brought new insights into the development of efficacy in teachers, stemming from their involvement in a research project. It also illustrates the professional learning for teachers involved in an RPP that can result in enduring efficacy.

Four implications of this study are; firstly, that research project involvement provides a particularly good opportunity for teachers to develop personal efficacy. Given that RPPs are long-term and are mutually beneficial collaborations between researchers and practitioners, teachers have time to consider pedagogical practices at a deeper level with expert others. They also have opportunities to try out new ideas with the support of those around them. This can lead to the development a deeper level of personal efficacy (Bandura 1997, Yang 2020).

A second implication is that if collective efficacy is a goal for teaching staff, shared language about learning and impact is critical and must be integrated into the early phases of the project (Hattie 2023). In particular, perceptions held in common will influence the actions of teachers. Shared language is more important than a shared way of teaching.

Thirdly, although engendering collective efficacy can be difficult, teacher engagement in a RPP provides affordances for its development. With this knowledge, schools should embrace opportunities to engage their teachers in research projects as a possible means to develop collective efficacy.

A fourth implication is that schools should acknowledge the professional development teachers have undergone through their involvement in research projects, and where possible should provide these teachers with opportunities to further collaborate with colleagues after the formal projects have been completed. This will permit time for further consolidation of their collective efficacy.

In conclusion, this study highlights the possibilities for beneficial outcomes from research projects. The development of individual and group efficacy was found to be a positive outcome from one such funded research project. This led to teachers demonstrating a commitment and sense of empowerment to take ongoing ownership of their inquiries, presenting a bricolage of practice possibilities. In the year following the RPP project, when teachers were leading their own research and programme of development, they became more prominent in their role as teacher leaders and were proactive and engaged with high levels of efficacy in exploring their own classroom practice.

## Disclosure statement

No potential conflict of interest was reported by the author(s).

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