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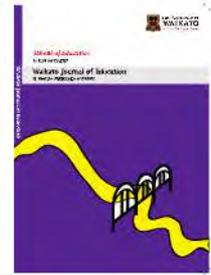
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Empowering Solomon Islands' beginning science teachers through the use of Appreciative Inquiry

James Porakari

Solomon Islands National University

Frances Edwards

University of Waikato

Abstract

This paper reports on a study that investigated the potential of using Appreciative Inquiry for exploring the development of three beginning science teachers in the Solomon Islands. Using the four phases of an Appreciative Inquiry framework, the teachers followed a process that allowed their strengths to be identified through the analysis of their stories of best-taught lessons. The findings indicate that the teachers felt they had strengths in knowledge bases relating to planning and teaching generally, and to teaching and learning science specifically. The teachers were able to identify and suggest actions for sustaining and developing their identified strengths. Involvement in the Appreciative Inquiry process allowed the teachers to speak positively, affirming their practice, and gave them agency in planning for future professional learning. This study adds to the sparse literature on beginning science teachers' strengths, in a Pacific context. This research suggests that through using an Appreciative Inquiry framework, beginning science teachers can be given the opportunity to identify strengths and positive elements of their teaching of science, and plan action to build on these strengths.

Keywords

Science; Appreciative Inquiry; Solomon Islands; teacher development

Introduction

Science education is an essential and valued element within the teaching and learning that occurs at all levels of the Solomon Islands' schooling system (Ministry of Education and Human Resources Development, 2007). The Solomon Islands curriculum outlines objectives that encompass learners' developing scientific knowledge and skills, including traditional scientific knowledge, so that they develop an understanding of the world they live in and are prepared to use science in their everyday lives and in further studies. Science teachers play a central role in this process, so it is therefore important that elements of their work are explored. In particular, the development of early career science teachers in the Solomon Islands is of special concern as they are in limited supply so their success is vital.



There are two major concerns regarding science teaching in the Solomon Islands, firstly the lack of specialist science teachers, and secondly an apparent lack of confidence in the science teachers that are employed. A number of studies focusing on beginning teachers and science teachers in the Solomon Islands have been conducted (e.g., Bosamata, 2009; Kakai, 2010; Kakai & Rickard, 2017; Giano, 2011; Rodie, 2014). Bosamata (2009) found that beginning secondary teachers faced challenges in their first and second years of teaching, and that these provided “barriers to teaching” (p. 87). For example, Bosamata found that classroom environments were not conducive to learning due to high temperatures in the afternoons, lack of teaching and learning resources and overcrowding. A qualitative case study completed two years later by Rodie (2011) with 11 beginning science teachers in the Solomon Islands experienced challenges in their first nine months including a lack of confidence, guidance and support; nervousness and shyness; heavy workload and a lack of resources. Many Solomon Island’s primary teachers are not confident enough to teach science and so omit science from their teaching programme altogether, while at secondary levels many schools have no laboratory classrooms and equipment, meaning that science is taught using only a blackboard and textbooks (Porakari, 2017). This echoes earlier observations of Smith when she observed that the “Solomon Islands suffers from both lack of teacher education and accessible equipment. As a result, science teaching tends to be of poor quality, with teachers relying on often outdated texts with little or no practical work being carried out” (Smith, 2009, as cited in Giano, 2011, p. 7). Teaching science in the Solomon Islands is therefore very challenging, particularly in the first few years of a teacher’s career.

Appreciative Inquiry (AI) is a process, a philosophy grounded in research, demonstrating that focusing on what is working and on aspirations for the future achieves more and does it more quickly and more sustainably, than a focus on solving problems (Cooperrider & Whitney, 2005). AI as a method and process has received a great deal of attention as a means to initiate changes in different fields in the last three decades (Cooperrider, Whitney, & Stavros, 2008). The approach focuses principally on the positive side of matters. In this way, AI is grounded in the actual peak experiences of individuals (Lord, 2005). The AI framework allows the researcher to engage in conversations and discussion with participants on their own terms as they narrate their own stories to convey their best practice.

To our knowledge, there have been no studies in the Solomon Islands focused on identifying beginning secondary science teachers’ strengths in terms of knowledge and skills, or their positive experiences in the first years of teaching. Instead, many studies focus on the challenges these teachers face. It was the intention of this research study to employ an AI framework in order to explore and identify the strengths that beginning secondary science teachers (BSTs) in the Solomon Islands brought to their classrooms in their first year of teaching practice, in order to provide fresh insights to science teaching in this context. This study was guided by the following research questions:

1. What strengths do BSTs identify during their first year of teaching?
2. What potential does AI hold for exploring BSTs’ strengths?

Literature review

During their first year of teaching, beginning teachers have been found to draw on a range of knowledge and skills as they develop expertise. Their classroom decisions are made as a result of their personalisation and application of what they are learning within the complex context of their school and community (Gess-Newsome, 2015). Carter (1990) describes teacher knowledge as the total knowledge that a teacher has at his or her disposal at a particular moment, which by definition underlies his or her actions. Nevertheless, not all actions require all the knowledge a teacher has since teachers, consciously or unconsciously, can refrain from using certain insights during their teaching (Edwards, 2017; Calderhead, 1996; Gess-Newsome 2015).

Lesson planning and preparation for learning

Knowledge about lesson planning may be thought of as straightforward for beginning teachers but a number of studies show that it is not the case (Calderhead, 1996; John, 2000, 2006; Mutton, Hagger, & Burn, 2011; Ruys, van Keer, & Aelterman, 2012). Calderhead (1996) acknowledges that planning is difficult for beginning teachers because “they lack the extensive knowledge base that is required” (p. 714), and therefore their planning focuses mostly on the development of strategies and activities for involving students with content. In their study on planning for collaborative learning, Ruys et al., (2012) found that beginning teachers have both strengths and weakness in their instructional planning. Their findings revealed that beginning teachers had strengths in designing appropriate learning tasks and developing adequate learning materials for their lessons but showed weaknesses in organisational aspects of collaborative learning implementation, such as defining rules, the arrangement of the classroom, group composition and timing.

John (2006) and Mutton et al. (2011) argue that the expectation that beginning teachers can plan well is unreasonable since their evidence revealed that beginning teachers learn most about how to plan once they gain much greater knowledge of what their planning can and cannot achieve. These studies also raise a concern that the creative, problem-solving, ‘intelligent’ aspects of planning and teaching can become lost as student teachers are encouraged to conform to rigid templates.

Classroom management and organisation

Definitions of classroom management and organisation vary, but usually include actions taken by the teacher to establish order, engage students, or elicit their cooperation (Emmer & Stough, 2001). Tillman (2005) and Simpson (2006) have stressed that classroom management is a common problem for beginning teachers. For example, a study involving beginning teachers in identifying serious problems they faced singled out classroom discipline as their most serious problem, with organisation of class work and dealing with problems of individual pupils also raised as concerns (Meister & Melnick, 2003). The same study also found that beginning teachers did not have the requisite knowledge of classroom procedures to understand the complex interrelationship between management, behaviour and academic tasks. These findings resonate well with the findings of Bosamata (2009), whose work with beginning secondary teachers in the Solomon Islands highlighted that these teachers considered classroom management and organisation barriers to teaching. This was found to have an impact on their teaching and their students’ learning.

Science content knowledge

Science content knowledge is an essential component of science teaching but beginning teachers sometimes do not know a subject in ways that allow them to explain it well to students (Reynolds, 1995). In a review of the challenges beginning science teachers face, Davis, Petish, and Smithey (2006) concluded that knowledge and beliefs about instruction are related to subject matter knowledge and results indicated that “stronger science knowledge typically co-occurs with more sophisticated ideas or practices with regard to instruction” (p. 623). The work of Usak, Ozden, and Eilks (2011) in Turkey revealed that beginning teachers’ subject content knowledge was deficient for the level they were teaching. These beginning science teachers did not bring a well-developed understanding of the essential concepts of chemical reactions with them from secondary school. Similarly, in the Solomon Islands, Giano (2011) and Rodie (2011) found that beginning teachers did not feel fully prepared to teach topics, especially practical aspects of science. Shulman (1986) has argued that knowing a subject for teaching requires more than knowing its facts and concepts. Teachers must also understand and attend to the organising principles and structures and the rules for establishing what is legitimate to do and say in a given field.

Knowledge of teaching strategies

Teachers of science use a range of instructional models. For example, in his review, Tytler (2007) found that student-centred inquiry-based teaching approaches were most useful in the teaching of science. Inquiry-based learning provides opportunities for students to explore and build new knowledge based on their previous knowledge, with the support of teachers, technology and peers. This student-centred approach is driven by questions or problems, and the teacher's role becomes that of the facilitator of the learning (Treagust & Tsui, 2014). Another example of an effective approach to teaching science concepts is based on the conceptual change approach (Duit & Treagust, 2003). This approach involves an exploration and challenging of students' prior science ideas. It then allows them to apply the established ideas to a range of new situations, followed by reflection and evaluation of the new perspective.

However, according to van Driel, Verloop, and de Vos (1998), beginning science teachers often experience conflicts between their personal views of science and science teaching on the one hand and their own actual classroom practice on the other. Moreover, their personal views sometimes lead to internal conflicts, and their resultant classroom practice may be variable. It has been found that the choice of instructional strategies is also influenced by constraints such as adherence to the local curriculum and high stakes testing and classroom management issues (Haney & McArthur, 2002; Zemba-Saul, Krajeik, & Blumenfeld, 2002).

Professional development for beginning science teachers

Studies have indicated that beginning teachers should not and cannot be expected to know and acquire all the necessary skills during their initial teacher education for teaching in their first year. McGee, Cowie, and Cooper's (2010) New Zealand study reveals that initial teacher education providers argue that in the time available for their teacher education programmes, it is impossible for student teachers to learn all that is required. They imply that initial teacher education is merely the initial phase of teacher preparation. McGee et al. (2010) suggest that during the two-year provisionally registered teacher phase, the provision of supervision and mentoring is important. Studies in the Solomon Islands of beginning secondary teachers (Bosamata, 2009; Rodie, 2011) also revealed that beginning teachers are faced with challenges in their first few years of teaching. Given these challenges, Bosamata's (2009) study suggested that mentoring be part of the beginning teachers' induction programme for Solomon Islands teachers.

Induction and mentoring programmes

Ingersoll and Strong's (2011) critical review of research, focusing on the impact of induction and mentoring programmes for beginning teachers, revealed that these provide a positive impact for beginning teachers. Those who participated in some kind of induction process were found to have higher satisfaction, commitment and retention and hence improved their classroom practices. These beginning teachers also improved in their ability to keep students on task, as well as developing workable lesson plans, using effective student questioning practices, adjusting classroom activities to meet students' interests, maintaining a positive classroom atmosphere and demonstrating successful classroom management. The review also shows that students of beginning teachers who participated in some kind of induction had higher scores or gains on academic achievement tests. Rodie (2011) argued for the need to develop the Solomon Islands' secondary schools as professional learning communities, or 'villages of learning' that promote and encourage reflection, ongoing professional conversations and collaboration between stakeholders in schools in order to enhance teachers' teaching practices.

Self-study and reflection

Billett (2001) describes teacher learning as the process of reflection and action through which teachers develop skills and acquire knowledge and expertise. This can happen at an individual level through the constant adjustment and modification of practice in response to actions, reactions, interactions and activities in the classroom, and in anticipation of approaching situations. Eraut (2002) suggests that teachers can learn by working with others within a school by asking questions, sharing information, seeking help, experimenting with innovative actions and seeking feedback. Loughran (2007) explains that to teach for understanding, teachers need to be learners themselves throughout their teaching careers; for example, beginning teachers as learners should be evaluating their daily lessons and reflecting on their practices.

Current reflection strategies often focus on problematic instead of positive experiences, but a study by Janssen, Els de Hullu and Tigelaar (2008), using concepts from positive psychology and solution-based therapy, shows that student teachers who reflected on positive experiences made more innovative resolutions. They were also more highly motivated to implement their resolutions and had more positive feelings than when reflecting on problematic experiences. This approach, known as Appreciative Inquiry, has been adopted for the current study and will be described in the following section.

Methodology

A qualitative interpretivist approach was taken in this study using an Appreciative Inquiry framework. The process of AI can be described in many ways but for this study, the original and common model of the 4-D cycle was used: Discover, Dream, Design, and Destiny (see Figure 1).

Figure 1. The Appreciative Inquiry model.



The actions within the phases can be summarised as follows:

1. Discover phase – based on dialogue and structured conversations, this phase investigates peak performance through narratives, to discover successes and strengths;
2. Dream phase – grounded in past performance this phase allows people to imagine where they would like to be as a teacher/organisation;
3. Design phase – combining stories from the Discovery phase and imagination from the Dream phase, this phase creates the structures and plans to move things forward; and
4. Destiny phase – This phase builds on the Dream and Design phases to create arrangements that maintain momentum for those involved.

Participants

Three beginning science teachers (one male and two female) teaching science to Years 7 to 9 in three different schools in and around Honiara, the capital of the Solomon Islands, agreed to be involved in this study as participants. All three participants had graduated from the Solomon Islands National University in 2015 and began their science teaching careers in 2016.

Data collection

The first phase of AI, Discovery, involved each participant identifying and appreciating the best aspects of his or her current professional practice. Experiences were recalled that related to moments when the individual felt he or she was performing at their best: a 'peak experience'. These experiences were narrated as descriptively as possible along with some insight into what made it a peak experience. Participants in this study were asked to identify three peak performances from their first year of science teaching.

The first author met with each participant at their respective schools for the Discovery phase. During this phase, each participant talked about their three best-taught science lessons using Pijin (Solomon Islands version), a language the participants felt more comfortable with when describing their lessons. Their stories were recorded on a digital recorder and were then transcribed and finally translated into English by the first author. Completed transcripts and their English translations were returned to each participant for checking, and at this stage clarifications or corrections were made where participants felt it was necessary. The English levels of the teachers were such that they could check for translation errors. Once the transcripts of the stories were verified, initial analysis of the data began and focused on identifying the participants' strengths through multiple readings of the transcripts of the stories. Thematic analysis was used, and coding of items allowed for categorisation and the identification of emergent themes (Miles, Huberman, & Saldana, 2014), which were identified as beginning science teachers' strengths.

The second phase in the research, Dream, involved participants considering their strengths and imagining what might be possible within their professional practice. The status quo was challenged by envisioning a more valued and vital future. Possibilities were created through the brainstorming of questions such as 'what would it be like if the best moments of professional practice were the norm rather than the exception?' (Lord, 2005). This phase was both practical and generative.

The Design phase was the third part of the AI process, and involved the teachers drawing together common themes from their personal experiences and their dreams in order to create propositions that acted as challenging value statements. These statements were designed to be provocative and stretching and creating the structure to move things forward. The final phase was Destiny and involved the development of a set of intentions for practice in the form of an action plan. In AI the Destiny phase can lead naturally to new discoveries which can begin the process anew. As Goldberg (2001) stated. "The process is as important as the end product" (p. 57).

The three phases Dream, Design and Destiny involved the first author working in close collaboration with the BSTs. Using the emerging themes identified in the Discovery phase, strengths of each BST were identified and in the Dream phase, strength-based propositions about science teaching were created. During the Design phase, each participant constructed three proposition statements based on their identified strengths. These statements were then used by the BSTs for planning action that aimed to amplify opportunities to enact these ideas in the future, in the Destiny phase.

The discussion that BSTs and the first author engaged in was also valuable in providing reflections on the AI process from the perspective of the BSTs. Their reflections provided insight into the value of the process they were undertaking.

Findings

The findings of this study are arranged under each phase of the 4-D cycle from the AI framework. This is followed by an important section on the reflections of BSTs on the AI process, through which its value was considered.

Phase 1 – Discovery

A total of nine best-taught lessons were shared by the participating beginning science teachers, covering various strands and sub-strands and topics of the Years 7 to 9 science syllabus. Based on the analysis of the stories and conversations held with the participants, we identified major themes that emerged as the beginning science teachers' strengths. These were:

1. knowledge of science content which includes knowledge of the science curriculum and syllabus
2. indigenous and local knowledge of the topics/concepts taught in their best lessons
3. formative assessment, including preparation of assessment tasks and integrating these into lessons
4. planning and implementing student-centred lessons and promoting students' active participation and learning in their lessons
5. various teaching strategies that accommodated their students' learning needs and styles
6. classroom management and organisational skills
7. designing and improvising simple science equipment for use in their science activities
8. the importance of continued interest in learning both formally and informally during their science teaching career
9. implementation of teaching styles which were based on students' prior knowledge and experiences which promote effective learning

Phase 2 – Dream

During the Dream phase, participants were engaged in *dreaming* about 'what could be possible', based on what they identified as their strengths. They were asked what their science teaching practice would look like if it were fully aligned around their identified strengths and aspirations, in order to establish ideals for their best science teaching practice — for example, if there were no barriers. Examples of Teacher 1's initial ideas follow:

1. I dream of being a mentor for other science teachers in my department for effective science teaching.
2. I dream that I feel confident and not afraid to teach student-centred lessons and promote active learning.
3. I dream of my students listening actively to my teaching of science.
4. I dream of being taught about different teaching strategies and being very effective in the teaching of science.
5. I dream of being taught about different eliciting strategies that can be used to explore students' prior knowledge and experiences on various science concepts.

The participating beginning science teachers' imaginings of what might be possible within their professional practice during the dream phase could be categorised as:

1. wanting to become mentors for other science teachers in the areas of effective lesson planning, classroom management and organisation and assessing science learning;
2. wanting to learn more about effective teaching and eliciting strategies, designing effective assessment tasks to assess students' learning, improvising simple science equipment, and classroom management and organisational skills;
3. wanting to do more for their students by listening to them and identifying their learning needs, knowing more about their contexts and creating learning environment conducive to their learning.

Phase 3 - Design

In the Design phase participants, together with the researchers, decided on 'what should be' based on the imaginings of 'what could be' in the Dream phase. The role of the researcher in this phase was to keep the discussion focused on the positive aspects of each beginning science teacher's teaching and to ask questions to refine ideas. This resulted in the construction of 'essence statements' or propositions. The following nine propositions were co-constructed.

Propositions

1. Teachers whose lessons are student-centred and promote students' active participation in their lessons also promote active learning.
2. Teachers whose teaching is based on students' prior knowledge and experiences promote effective learning.
3. Teachers whose teaching is based on a variety of teaching strategies accommodate their students' learning needs and styles.
4. Science teachers who have knowledge of the science content, curriculum and syllabus are able to plan effective science lessons.
5. Science teachers whose classroom management and organisational skills are effective create and maintain effective learning environments for their students.
6. Science teachers who are dynamic have an abundance of resources at their fingertips, no matter what area of science they are teaching.
7. Science teachers who have indigenous and local context knowledge understand their students' learning needs and plan and organise learning activities that are relevant to their needs.
8. Science teachers who understand how to prepare formative assessment tasks and effectively integrate them into their lessons are able to assess their students' learning and amend their teaching accordingly.
9. Science teachers continue to learn in various ways both formal and informal during their careers as science teachers.

Phase 4 - Destiny

In the final phase, workable plans were developed and put in place to continue strengthening the identified strengths and dreams of the participating beginning science teachers. This was in order to 'create what will be', the final stage in the AI process. The identified actions and timing for the propositions developed in this study are summarised in Table 1.

Table 1: Action Plan for the Provocative Propositions

Proposition statement	Action	When
Science teachers whose lessons are student-centred and promote students' active participation in their lessons promote active learning.	Review teaching strategies and student activities to ensure variety and opportunity for teacher-student improvement.	After each lesson and ongoing
	Attend more PD training to learn more eliciting strategies from other science teachers.	When PD is offered and ongoing
	Engage in regular feedback sessions with students to know more about ways to engage them in lessons.	At intervals of every two weeks
Science teachers whose teaching is based on students' prior knowledge and experiences promote effective learning.	Engage in regular eliciting sessions with students to know more about their prior knowledge and experiences for each concept.	Ongoing
	Attend more PD training to learn more eliciting strategies from other science teachers.	When PD is offered and ongoing
Science teachers whose teaching is based on a variety of teaching strategies accommodate their students' learning needs and styles.	Be willing to try different teaching strategies, even knowing that I may be unsure where the lesson might go.	Ongoing
	Attend more PD training to learn more teaching strategies from other science teachers.	Ongoing
	Review teaching strategies and student activities to ensure variety and opportunity for teacher-student improvement.	After each lesson and ongoing
	Obtain student feedback on my teaching practice each term.	Each term and ongoing
Science teachers with knowledge of the science content, curriculum and syllabus are able to plan effective science lessons.	Continue to develop content and curriculum knowledge and skills via PD workshops, reading and reflective journaling.	When PD workshops are available and ongoing
	Attend in-house training and sharing of new content and curriculum knowledge with other science staff.	Twice a year and ongoing

Science teachers whose classroom management and organisational skills are effective create and maintain effective learning environments for their students.	Continue to develop classroom and organisational skills via PD workshops, reading and reflective journaling. Continue sharing with other science staff classroom and organisation skills during in-house training.	When PD workshops are available and ongoing. Twice a year and ongoing
Science teachers who are dynamic have an abundance of resources at their fingertips, no matter what area of science they are teaching.	Continue to develop materials to use in my science activities via PD workshops, reading and reflective journaling. Continue sharing with other science staff improvisation skills during in-house training.	When PD workshops are available and ongoing. Twice a year and ongoing
Science teachers who have indigenous and local context knowledge understand their students' learning needs and plan, and organise learning activities that are relevant to their needs.	Engage with local communities where students come from to know them better. Increase interaction with students to better understand their learning needs.	End of each term during Parents' Day Ongoing
Science teachers who understand how to prepare formative assessment tasks and effectively integrate them into their lesson are able to assess their students' learning and amend their teaching accordingly.	Engage in regular lesson assessment feedback to students. Monitor and develop assessment skills and knowledge via PD workshops and self-reflections.	After each lesson and ongoing Ongoing and when PD workshops are available
Science teachers continue to learn in various ways both formal and informal during their careers as science teachers.	Engage in the regular development of knowledge of teaching used and developed within science teaching practice. Attend PD workshops on content, curriculum and assessment.	Ongoing When PD workshops are available and ongoing

The actions and timing in Table 1 can be summarised as:

1. attending workshops, conferences and PD programmes when organised by the Ministry of Education Human Resources Development and Education Authorities;
2. continuing to engage in developing areas of interest like curriculum, content, assessment and teaching strategies;
3. continuing to assess students' learning and providing timely feedback to students; and
4. continuing to engage in self-reflection on their practices to improve their teaching of science.

Teacher reflections

As the teachers reflected on their practice through the AI process they were able to speak positively about their teaching and their decision-making, given that they were talking about their best-taught lessons. There appeared to be a sense of pride in what they said. For example, Teacher 1 commented on the positive outcome of her planning:

This lesson was different from other lessons I planned and organised. Seeing my students actively participating is great.

Being able to talk explicitly about the 'success stories' was found to be very affirming for the teachers. For example, Teacher 3 talked about the benefits he found through the use of group work in class:

Also, instead of asking each group to increase the number of coils for each electromagnet, different groups used different numbers of coils and shared results with other groups. This made the lesson more interesting because of students sharing their results.

Teacher 2 discussed the trial of activity cards when teaching about ionic bonding and noted that her science knowledge was a strength contributing to good teaching in this topic. She also talked positively about her students' reactions to the activity she had designed for them.

As you are already aware in our country, getting students to talk and participate during lessons is a challenge but for this lesson, my students were enjoying the activity and easily identifying the formula of the ionic compounds using the cards. My knowledge and understanding of the concepts did make things easier for me.

The BSTs were able to articulate difficulties they faced in their very poorly resourced schools by focusing on how they overcame challenges or used their local knowledge to their benefit. For example, Teacher 3 understood the lives of the students he taught and was able to group students according to their home situation for a topic he was teaching. This teacher taught in an isolated school with minimal resourcing yet was able to speak positively about the decisions he made. He identified that these decisions resulted in better learning for his students.

I have knowledge of where my students lived and understood their hardship and this lesson addressed some of their experiences and hardships. Because the lesson was on a topic that they were familiar, my students were participating actively.

For example, students who lived close to rivers formed one group, another group for those staying close to forests, another group for those living close to the seashore and the last group were the ones that lived on artificial islands built on stones.

Teacher 2 also talked about working in very constrained circumstances. She articulated a positive response to this focusing on what she could do, rather than what she could not do:

When there is lack of resources and science equipment I developed myself to be resourceful rather than just complaining... I wanted to organise a science field visit to a coral reef beyond the city boundary but due to challenges in finances and

transportation, I decided instead to plan a group discussion lesson. I knew my students well and their backgrounds so I grouped the students into groups according to the type of marine ecosystems they had experience and knowledge on.

Having good knowledge of content, curriculum and syllabus, I am equipped to improvise simple science equipment and search for materials when the need arises.

A sense of control over challenges was also communicated by Teacher 3 as he talked about her self-awareness of gaps in his science knowledge and the actions he was able to take to remedy these:

I myself am not good in physics but reading and researching more about these physics concepts made me understand them and this provided me with ideas how I should plan my lessons and what types of materials I would prepare or improvise.

Articulating a sense of agency was a common theme across teachers' reflections as they considered their performance as a BST, and the actions they could take to further develop as effective teachers, in their own contexts.

Discussion

The research question in this study focused on the potential AI could hold for exploring BSTs' strengths in the teaching of science. In this section, findings are discussed that focus on the BSTs use of the AI cycle, the benefits of focusing on positive practice for the BSTs, and the potential for AI as a framework to use with beginning or developing teachers.

Firstly, it was evident from the study's findings that applying the AI approach to their teaching enabled the BSTs to identify and work with their strengths. Through the Discovery phase of the AI cycle they were easily able to identify and narrate their best-taught lessons or experiences. Their strengths were varied, with some surprises. For example, teachers identified their science knowledge as a strength. This contrasts with literature that argues that teachers do not feel prepared to teach content including science (Giano, 2011; Rodie, 2009; Usak et al., 2011). Although not claiming to have a thorough and comprehensive knowledge of all areas of science, the teachers were able to articulate their indigenous and local knowledge, and their ability to continue to learn science. They discussed their ability to draw on their knowledge effectively, in ways similar to those explained by Carter (1990) and were able to plan ways to continue the development of their knowledge. The teachers also identified strengths in areas such as planning and classroom management, two areas reportedly often recognised as challenges for beginning teachers (Calderhead, 1996; Mutton et al., 2011; Tillman, 2005). Using the Dream, Design, and Destiny phases of the AI process, BSTs were able to reflect on their strengths, then move on to imagine how they might build on those strengths to become the teachers they aspired to be, and map ways to continue developing and improving their practice towards achieving that goal. As described by Gergen, Gergen, and Barrett (2015), AI allowed co-creation of new worlds, giving teachers agency in the design of their futures.

Focusing on teaching through a positive lens has been found to be useful for mentoring preservice teachers, as it helps create positive professional identity (He, 2013). In particular, the teachers in this study were able to reflect on aspects of their practice that had positive meaning for them, identifying strengths and planning accordingly as a result of the AI process. This gave them agency, which might not have been possible if the focus had been on studying challenges faced by BSTs. Based on this study we argue that the same is likely to be true for other BSTs in the Solomon Islands. A focus on their stories of success generated positive energy and pride for the teachers in this study as they shared their stories with the researchers. Through their reflections, they communicated a sense of ownership and commitment to their professional growth. The AI process offers new possibilities for professional practices such as their teaching in the future. Its positive nature adds an important element to its transformative potential (Gergen et al., 2015). In this study, the use of AI encouraged BSTs to become aware of, and focus on, the positive elements of their science teaching and practice within their current contexts, which are unlike the contexts reported in most literature on beginner teachers. The final stage

of the AI cycle provided the BSTs with a practical plan of action to implement and to help them move towards the professional future they envisaged for themselves.

This study is limited by its size, as it is based on the experiences of three beginning science teachers. However, these teachers were like many of the teachers starting their careers in the Solomon Islands and we believe there are potential implications that we can take from what we have found.

Implications

Conducting this inquiry using the AI framework has provided some thought-provoking insights into the Solomon Islands beginning science teachers' development. It has also raised possibilities for a future professional development model in the Solomon Islands. Unlike previous studies which explored the challenges and barriers often in place for Solomon Island beginning teachers (e.g., Bosamata 2009; Rodie, 2011), this study offers insight on 'the other side of the coin', that is, what teachers perceived as the positive aspects of their practice and context. Hoekstra and Korthagen (2011) suggest that the ability for teachers to reflect on positive aspects of their practice and positive experiences may be more beneficial to professional learning than focusing on challenges and weaknesses. Use of AI within a professional development model in the Solomon Islands could prove to be beneficial to teachers, and further research along these lines would be useful.

The AI process allows teachers to consider themselves as whole persons who are growing in their identity as teachers. The positive focus of the process is seen as cumulative and contributing to professional and personal growth as "positive emotions have a complementary effect: They *broaden* people's momentary thought-action repertoires, widening the array of the thoughts and actions that come to mind" (Fredrickson, 2002, p. 122). AI is, therefore, a process with the considerable potential to promote teacher development in the Solomon Islands within their 'villages of learning'. The implementation of AI as part of teacher mentoring and support in the Solomon Islands teachers' early careers has the potential to encourage and strengthen them as they partake and have agency in planning for continued growth and success in their futures.

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