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A Japanese Teacher Training Lesson Study Approach: A PALAR Approach for South African Teacher Professional Development[2]

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Abstract

UNESCO's Global Action Programme promotes the transformation of learning and training environments and capacity development programmes. The Japanese Lesson Study Approach (LSA) is a type of teacher professional development used in higher education teacher training. Four South African researchers share their learning of the learner-centred LSA presented by a team of Japanese pre-service teachers as part of their professional development. This article contributes to the discourse on how teacher training in higher education can be augmented using the collaborative and reflective LSA for pre-service teacher professional development with elements of the participatory action learning and action research approach. In this case study, the researchers used the qualitative Reformed Teaching Observation Protocol instrument and together thematically analysed the data that were open coded to find common themes. The findings confirm that meticulous collaborative lesson planning and post-lesson reflection forums are important in the LSA to improve lesson content and presentation. The article recommends the use of the LSA as a participatory approach using action learning to support teacher professional development in higher education. Pertinent questions emerged for lecturers to use during lesson reflection forums for quality education.

Keywords: lesson study approach, pre-service teachers, professional development, teacher training, participatory action learning and action research approach

Introduction

The United Nations Educational, Scientific, and Cultural Organisation (UNESCO, 2014) advocated for innovative teaching and learning methods with sustainable development in mind, and for a participatory approach at universities to support interdisciplinary interaction. UNESCO continues to call for the transformation of learning and training environments, as well as capacity-development programmes for educators so that they are made aware of the strengths and weaknesses of the pedagogical approaches they use. One example of how the latter can be achieved is by implementing the Lesson Study Approach (LSA) in teacher professional development (UNESCO, 2014, 2020). In Japan where the LSA originated, teachers use LSA—an inquiry model of teacher professional development (Rock & Wilson, 2005)—as an essential part of their teaching, especially in the implementation of new curricula (Takahashi, 2014).

Using the LSA, Japanese schools establish a system of peer observation of classroom instruction that fosters collective professional development within communities of practice. The LSA is a professional development activity that is collaborative, action-oriented, cyclical, context-based, improvement-oriented, and teacher-owned (Chikamori et al., 2013; Ono & Ferreira, 2010). It is more likely for constructivist teaching methods to assist pre-service teachers in creating in-depth learning strategies that can enhance their actual classroom instruction (Dejene et al., 2018), therefore lecturers may want to think about implementing constructivist teaching techniques in their classrooms. In higher education, pre-service teachers can also benefit from participatory approaches. This article reports on

research conducted by South African researchers in Japan. The purpose of the article is to share the learning of Japanese teacher professional development in pre-service teacher training in higher education when using a collaborative and reflective LSA.

Problem Statement

The LSA, in Japan, has been the main source of professional development for both pre-service and in-service teachers (Lewis, 2000). Japan strongly promotes science and technology in high school science education (Ministry of Education, 2016). The 2015 Trends in International Mathematics and Science Study survey revealed that although Japanese learners scored high in science (systematic knowledge), their science literacy (scientific concepts and processes) was low (Ministry of Education, Culture, Sports, Science, and Technology, 2016). Thus, a measure taken in Japanese education was to provide Japanese teachers with the opportunity through LSA to observe new pedagogical methods, assess the teaching of their colleagues, and provide constructive feedback to encourage reflective practice and improvement. The LSA has enhanced teacher practice and knowledge in North America (Rock & Wilson, 2005), as well as teacher knowledge, teaching materials, and instruction in mathematics education (Lewis et al., 2009). The same is true for the growth of the capacity of American teachers to enhance mathematics instruction by creating high-quality instructional practices that are shared (Gibbons et al., 2017). The quality of education in Iran has been impacted by the integration of the Japanese LSA (Sarkar Arani, 2015).

The need for learner-centred, reflective, critical, participatory, and reflective pedagogies in higher education has long been expressed (Christie et al., 2013; Lotz-Sisitka et al., 2007; Sterling, 2013). Therefore, higher education lecturers must change the way they approach teaching (Tomas et al., 2017). Global interest is growing in the evidence for improving teacher professional development in education through the provision of opportunities for active learning for educators (Rasmussen, 2016; UNESCO, 2014). Pre-service teachers in Denmark acquire practice-related knowledge during post-lesson reflection (Rasmussen, 2016). The LSA experience in Spain suggests that teacher preparation programmes should support the reconstruction of pre-service teachers' practical knowledge and their professional development (Mayorga Fernández et al., 2021). Further, professional development is the main goal of LSA in Thailand (Mizoguchi et al., 2020).

In terms of educational scientific research, Africa is underdeveloped (Mitchell & Rose, 2017), particularly when it comes to teacher preparation (Chisingui & Costa, 2020). Data from the 2019 Teaching and Learning International Survey (TALIS) showed that only 67% of South African teachers took part in training centred on peer learning and coaching, and teachers nationwide spent excessive amounts of time on administrative duties (Joint Education Trust Education Services, 2019). Research on the LSA in science and math education in South Africa revealed that in-service teachers at the provincial level could acquire the necessary skills and competencies to teach these subjects with confidence and enhance student learning (Ono & Ferreira, 2010). As a result, the South African researchers who conducted this study realised the importance of investigating how teacher professional development of pre-service teachers can be strengthened by applying the LSA's critical reflection and collaborative approach. Pre-service teachers can create transformative, exploratory, and action-oriented lessons with learning environments that encourage students to live sustainably with the help of higher education (UNESCO, 2014). The following research problem emerged from the outline above: “How

can teacher professional development of pre-service teachers in higher education be augmented by a collaborative and reflective LSA?"

Next, a short overview of the literature is provided, followed by discussions of the theoretical underpinnings, the research methodology, and the two themes that emerged from the research. The article ends with a discussion of the results, the limitations of the study, a conclusion, and recommendations.

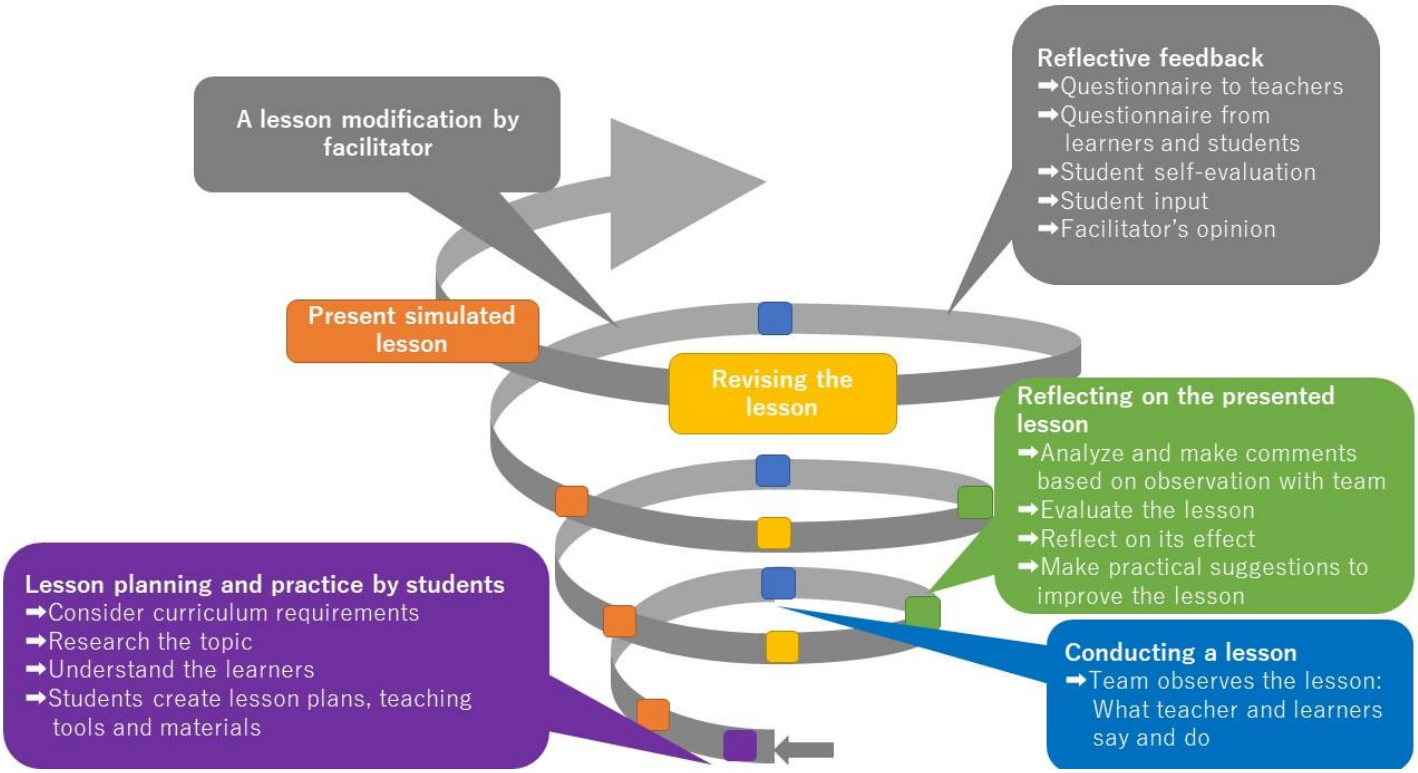
Literature Review

In Japan (Fernandez & Yoshida, 2004), Vietnam, and Indonesia (Suratno & Iskandar, 2010), the LSA is a well-liked method of professional development for teachers, and its popularity is rising in the West (Fernandez, 2002; Lewis et al., 2009). Pre-service teachers in England reported that the team approach helped them grow as teachers, and a collaborative approach utilising the LSA enhanced support for teacher development in pre-service teacher practice placements (Cajkler et al., 2013).

The LSA is a type of classroom research that has been used in Japan since the 1960s. Up to six teachers choose a topic and create a lesson to examine the teaching and learning of the topic within the framework of a real single-class lesson (Ono & Ferreira, 2010; Posch, 2019). In order to raise the standard of instruction, systematic inquiry into teaching practices is conducted in cycles (Fernandez, 2002), as shown in Figure 1.

Figure 1

The LSA as a Cyclical Process at a Japanese University (adapted from Chikamori et al., 2013)



In the planning phase of Cycle 1 (Figure 1), the focus is on the selection of a topic for a specific grade and the choice of the teaching materials and equipment used to fit the theme, grade, and curriculum requirements (Chikamori et al., 2013). The teachers must have a good understanding of their learners' needs, pre-knowledge, and misconceptions. They must anticipate the challenges the learners may encounter in the lesson and be prepared with appropriate strategies to assist them. In addition to being aware of the needs of their learners, teachers should research the topic further and provide clarification on any ambiguities so they can confidently impart content knowledge (Ono & Ferreira, 2010). The team (lecturers/professors of the same subject or teachers of the same grade) observes the lesson and gathers data on the learners' engagement and response as a measure of learning. The teacher follows the plan when delivering the actual study lesson (Wajdi, 2017). To make taking notes easier, photocopies of the lesson's framework can be given to each observer. The observers listen attentively to all contributions made by the learners and make notes on the lesson plan in the form of critical remarks. The observational notes on a lesson plan serve as evidence for later discussions in a post-lesson reflection forum. The post-lesson reflection forum follows immediately after the lesson or later that same day. All observers are encouraged to contribute to refining and improving the lesson by asking for clarification, recognising the strengths or good aspects, and identifying the challenges in the lesson (Ono & Ferreira, 2010). The reflection forum is guided by a discussion among the observers and the teacher to enhance the learning process. This means the objectives they set will be more easily achieved because there is good cooperation and unity among the teachers (Wajdi, 2017). After the discussion has been finalised, an improved version of the lesson is prepared. This first step in theorising practical knowledge allows for personal meanings to be constructed from experience, reflection, and discussions with other team members of the LSA (Posch, 2019).

In Cycle 2, another teacher in the team teaches the improved version of the lesson to other learners. The same process of observation and analysis is followed. The first cycle focuses on the observation of the research lesson, and a critical discussion of the design and implementation of the lesson leads to implicit theory building. The second cycle and its new lesson that is designed and presented lead to explicit knowledge that is transformed into implicit knowledge. The process can be intensified in the third phase (Posch, 2019).

A third cycle may be added when the findings are written up and presented to other interested teachers (Posch, 2019). The use of two or three cycles in the LSA draws on the cycles used in action research (Soto Gómez et al., 2015). The twofold aim thereof is to improve teaching and learning in a specific lesson (the research lesson) and to improve the practical knowledge of teachers (Posch, 2019).

Teachers working together as a team to improve a lesson through critical reflection as part of an ongoing professional development process (Chikamori et al., 2013) can lead to better problem-solving and teaching and learning outcomes (Ainscow et al., 2006). The 2008 TALIS reported a higher percentage of recently hired in-service teachers (compared to experienced in-service teachers) believed that the evaluation and feedback they received was fair and beneficial to their professional growth (Jensen et al., 2012). It seems, therefore, that in-service teachers are open to receiving constructive criticism.

One distinctive aspect of LSA is the long-term, incremental enhancement of practices through a cycle of investigating teaching methods and resources, organising and carrying out a lesson, and group reflection on the lesson. Peer teaching is frequently employed in LSA research as well as teacher education (Fernandez, 2005). Research has looked into the advantages of LSA for teachers, students, or both (Cheung & Wong, 2014), and the second and the third research lesson have been shown to be "more impactful than . . . the first research lesson" (O'Shea et al., 2015, p. 62). Japanese educators attribute their improved teaching to studying their lessons within the context of a classroom lesson (Stigler & Hiebert, 1999). Research lessons are essential for enhancing teaching at the individual, school-wide, and national levels (Lewis (2000). Japanese teachers are encouraged to work together, develop into reflective, collegial practitioners, and enhance their teaching over time through the cyclical process of LSA (Stigler & Hiebert, 1999). The adaptability of LSA makes it suitable for use in a variety of teacher education scenarios (Regan et al., 2016).

The format of LSA utilised at the Japanese university's college of education in science education where the authors conducted their research (Figure 1), was exclusively for the promotion of entomology and education for sustainable development (ESD) for 2030 (UNESCO, 2020). First-, third-, and fourth-year undergraduate pre-service teachers and a graduate teacher in the master's course who usually conducts research on insects chose content from science textbooks for elementary, junior high, and high school that was suitable for performing experiments using insects kept in the laboratory. The pre-service teachers developed teaching materials considering the characteristics of each insect to fit the respective content. This step took some time but provided a good opportunity for gaining a deeper understanding of insects and the curriculum content. Good lessons were selected and prepared for elementary schools. Depending on the number of learners in each school, teaching teams consisting of five to 10 pre-service teachers per team were formed. The teams prepared and presented lessons using the LSA, improving their lesson by working their way through up to six cycles of the LSA.

A Theoretical Underpinning of the Lesson Study Approach

Each step and cycle of the LSA (Figure 1) produce increased professional knowledge and skills that are validated by constructivism (Vygotsky, 1978). The application of the LSA as a possible means of enhancing teacher professional knowledge and development is supported by the social constructivist framework (Rock & Wilson, 2005; Voogt et al., 2015). LSA is based on the general theory of constructivism, with an emphasis on the social constructivism tenets of cooperative collaboration, reflection, analysis, proactive responses, evaluation, and sharing of understandings. The LSA provides a collaborative approach that addresses social aspects of learning and has immediate application in the classroom (Engeström, 1987; Greeno & Middle School Mathematics through Applications Project Group, 1998). The central tenet of social constructivism is that knowledge is created via social interaction and shared experiences (Vygotsky, 1978). This principle supports teacher activities where knowledge is constructed through verbal interaction in the form of social negotiation, discourse, reflection, and explanation among the team of teachers. Vygotsky's (1997) sociocultural theory referred to a process of learning when knowledge is the result of active mental processing through social interaction.

Teachers taking part in the LSA interact socially as they reflect on their experiences, create, and evaluate their understanding thereof, and explain their understanding to their peers in the team (Rock & Wilson,

2005). Participatory action learning and action research (PALAR)'s theory of learning supports the LSA because it includes adult learning theory in general, action learning, and experiential learning (Zuber-Skerritt, 2015). Teachers participating in PALAR can generate new knowledge based on their experience and initiate the next cycle of experiential learning and knowledge creation (Zuber-Skerritt, 2015) through the LSA by critically analysing their own experiences and presenting newly improved lessons. One well-known educational theory is Kolb's (1984) theory of experiential learning, and a cycle of experiential learning and knowledge creation can occur after the experience has been tested through a cycle of LSA, creating a new experience. In transformative learning, where group or individual interactions call for critical-dialectical discourse, critical reflections are also crucial (Mezirow, 2003). Both the constructivist and transformative learning philosophies concur that, as with LSA, personal meanings are the result of individual experience and are verified by interpersonal interaction (Mezirow, 1991).

Research Design and Procedures

A qualitative approach and single-case study design were adopted (Yin, 2003). The purposive sampling included a team of pre-service elementary teachers assigned to a school to promote entomology and ESD. An observational instrument was used to reflect on teaching praxis using LSA. The data gathered were related to teacher education pedagogies for teacher professional development in higher education. The thematic analysis of the data revealed codes, categories, and themes where the researchers were central to the process (Merriam & Tisdell, 2016).

Methodology

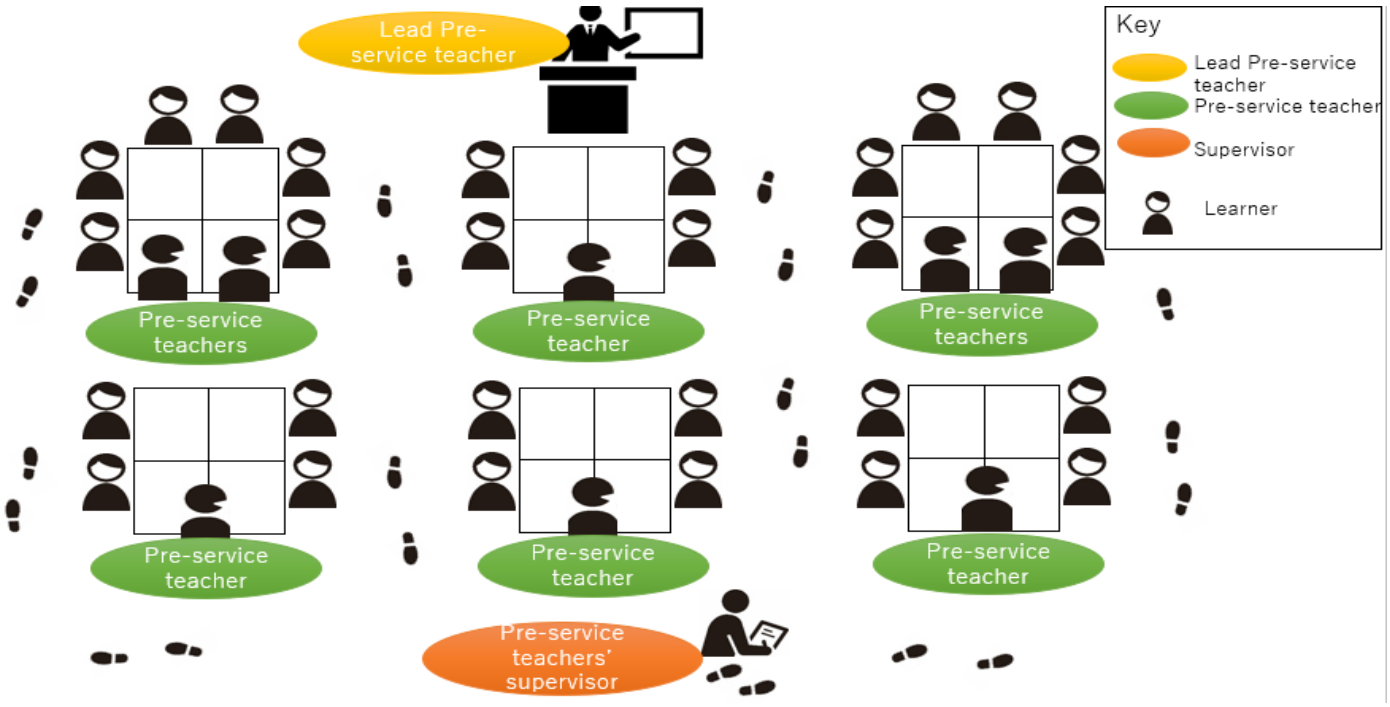
The study researched the LSA among pre-service teachers who themselves were engaged in action research given that the participants were involved in the action of improving their skills for teacher professional development in a collaborative way. The LSA in pre-service teacher training started in 2014 as part of a teaching practice course at a university in Japan. The total number of lessons following the LSA presented in 2018 was 18 lessons for elementary, junior high, and high school. The LSA that was observed by the researchers from South Africa in 2018, was the sixth of six lessons for elementary school for the year by a team of pre-service teachers. Improvements to the elementary school lesson were undertaken as follows. The Japanese lecturer (university professor) guided the team of pre-service teachers before their sixth lesson presentation. He facilitated the pre-service teachers to plan and prepare questions to ask learners, which could influence how they thought during their critical reflection meeting—highlighting that critical reflection is a central requirement for transformation (Zuber-Skerritt, 2015). The pre-service teachers were guided in their preparation by facilitating them to remember to make eye contact with the learners during each experiment. Furthermore, the pre-service teachers were reminded of the importance of learners' questions and the prioritisation of answering these questions. The pre-service teachers prepared teaching materials and methods based on the improvement points, and conducted several mock lessons at the university by playing the role of learners.

The Japanese lecturer recorded his reflection notes in his journal during his facilitation when he observed the lessons presented by his pre-service teachers in the preceding cycles. In line with the cycle requirements of the LSA, the team of pre-service teachers collaboratively prepared the lesson

facilitated by the lecturer. The sixth lesson was presented by the team of pre-service teachers to Grade 3 learners in the subject of general education. Altogether, 32 learners were facilitated by pre-service teachers stationed at each table with four to five learners (cf. Figure 2). One or two pre-service teachers were stationed at each table with four to five learners seated around the table. The lesson theme was the metamorphosis life cycle of insects with a specific focus on the army worm and its parasitoid. The use of the army worm and the wasp as a natural science high school practical was described in (Nakamatsu & Tanaka, 2006). Data were gathered by the four South African researchers during the lesson presentation. The research interest was how the LSA could augment teacher professional development of pre-service teachers in teaching practice courses (methodology modules) using a collaborative and reflective approach in higher education teacher training.

Figure 2

Classroom Layout During a LSA Lesson Presentation



Paradigm

The research of this study was based on the interpretivist epistemology that is socially constructed where the reality is complex and multi-layered. The phenomenon being researched had multiple interpretations, and the research methodology applied helped to understand how to interpret the LSA used in pre-service teacher training. Knowledge lies within the human experience and is dependent on the context (Chilisa & Kawulich, 2012). The researchers interpreted their data with the aim of enhancing teacher professional development in higher education.

Sampling Strategy

The choice of participants was guided by the following criteria: teaching about entomology to address ESD, enrolment in a teaching practice course (methodology module), and the implementation of the

LSA. The pre-service teachers in the Graduate School of Education in the Faculty of Education were studying towards an elementary teacher qualification, and were assigned to teach about entomology to address ESD in their teaching practice course. One LSA team met the criteria because of their lesson topic—bodily structure, growth, and development of the insect. The purposive sampling of one team of 16 participants was made up of first-, third-, and fourth-year pre-service teachers (9 women and 7 men) with ages ranging from 20 to 28 years. There was only one graduate teacher among them with in-service teaching experience. The pre-service teachers were enrolled in the science curriculum and pedagogy course that incorporated the LSA into their teaching praxis. One Japanese university lecturer formed part of the study as a facilitator assisting pre-service teachers during the process by determining the research lesson objective and arranging times and classes for the teaching practice of the research lessons. After the research lesson had been presented (as was the case with all lessons presented), a reflection forum was held with the pre-service teachers, the lecturer, and the four South African researchers. In the post-lesson reflection forum, the pre-service teachers discussed improvements to the lesson that had been presented and made notes to apply those changes to the next lesson that would be presented.

Method Used for Data Gathering

Four South African researchers who formed part of the collaborative research project between South Africa and Japan titled, *Lessons From Japan Regarding Indigenous Knowledge Related to the Use of Beneficial Insects to Enhance Teacher Professional Development in South Africa* were up to date with the lessons presented by the team of pre-service teachers. The four researchers observed the sixth lesson presentation by pre-service teachers using the LSA. The researchers used the Reformed Teaching Observation Protocol (RTOP) observational instrument, and observation notes were recorded. Permission was obtained from the developers of the RTOP instrument to use their instrument. The instrument assesses the degree to which science instruction is "reformed." The instrument encapsulated the recommendations and standards for the teaching of science that were made known by professional societies of science educators (Sawada et al., 2000). The use of the instrument resulted in a large amount of qualitative data in the form of observation notes being gathered by the four South African researchers. Supplementary data included lesson plans, handouts, and photographs. The translated reflection notes of the Japanese university lecturer who acted as the pre-service teachers' facilitator were also analysed to obtain themes that could assist in enhancing teacher training in higher education using Japanese LSA for teacher professional development. Throughout the cycles of the LSA, the pre-service teachers presented their planned lesson to learners and recorded them for the analysis thereof during their reflection discussion. It is common practice to analyse and measure the nature and quality of post-lesson reflection in the context of pre-service teacher education (Dinkelman, 2000; Suratno & Iskandar, 2010; Ward & McCotter, 2004).

Method of Data Analysis

The analysis of the data focused on the research question: "How can teacher professional development of pre-service teachers in higher education be augmented by a collaborative and reflective LSA?" The data analysis took place in phases (Braun & Clarke, 2006). In the first phase, the researchers gathered all the lesson observation notes, reflection discussion notes, lesson plans, handouts, and photographs

of the lesson that had been observed. The researchers read and reread through all the data to familiarise themselves with the data and noted initial codes that emerged. This was done within the first five days following the lesson observation. The lecturer's translated reflection journal, once received, was also subjected to rereading with initial codes noted. In Phase 2, initial codes were generated, and some codes were recoded. The data were subjected to open coding to find common codes through inductive thematic analysis (Saldaña, 2009). Open coding was chosen because when exploring the data, the researchers identified units of analysis. For example, worksheets, dissecting insects, and graphs, among other things, are techniques that form part of the dimensions of the code *teaching technique*. The coding of the RTOP instrument that was used during the lesson observation briefly catered for structured note keeping regarding the contextual background, activities of the lesson, classroom setting, details about the learners and teacher, lesson design and implementation, lesson content, and classroom culture. The reflection discussion between the Japanese university lecturer, the pre-service teachers, and the researchers yielded data that captured the lesson plans, handouts, and photographs that had been scrutinised, detailing their content in the reflection discussion. The lecturer's reflection journal also yielded codes. In Phase 3, the researchers looked for recurring regularities in the data (Merriam & Tisdell, 2016). The codes then yielded categories. In Phase 4, the data sets were revisited several times to determine that the emerging themes really were themes. In Phase 5, the names of the codes were adjusted after confirming that they carried the same meaning as the codes that had emerged from the codes generated in Phase 2. In Phase 6, the researchers began to write up the data findings with supporting quotations.

Strategies were utilised to establish trustworthiness. The criterion used for credibility (truth value) was the use of peer examination, where an independent expert ensured that the data had been interpreted accurately, and minor adjustments were made based on suggestions received. The code-recode procedure described in Phases 2 and 5 was the criterion chosen for dependability (consistency). Triangulation was the method chosen to establish confirmability (neutrality). The data sources named in Phase 1 provided a range of data that contributed to a comprehensive understanding of the phenomenon being researched (Krefting, 1991).

Ethical Consideration

The Ethics Committee of the North-West University granted ethics approval for the research. Permission was obtained from the developers of the RTOP instrument for research purposes. Consent was obtained from the school principal at the practice school to visit the school and to observe the lesson. The next section of this article presents the results and a discussion of the data that were gathered and analysed.

Discussion of Themes

The analysis of this qualitative research helped to answer the research question: "How can teacher professional development of pre-service teachers in higher education be augmented by a collaborative and reflective LSA?" The findings revealed how pre-service teachers planned lessons collaboratively through the LSA. Through collaborative planning and reflection, pre-service teachers presented a lesson that included various teaching and learning strategies and techniques, strengthening what Darling-

Hammond (2003) referred to when stating that teachers learn best by reflecting on their work and collaborating with other teachers over an extended period (Soto Gómez et al., 2015). Two themes emerged from the analysis: 1) meticulous collaborative lesson planning, and 2) post-lesson reflection forums. The code "R*n*" will be used in the discussion below to designate the four researchers from South Africa.

Theme 1: Meticulous Collaborative Lesson Planning

There was consensus among the researchers in their reflections of the lesson plan prior to the lesson being presented that they were "not sure if they will be able to work through all these slides in one lesson" (R3) and that it "looks complex for the time available" (R1). It was agreed that the technical content in the printout of the 23 PowerPoint slides was too complex for the pre-service teachers to effectively engage the learners for the whole lesson. The consensus among the researchers in their reflections after the lesson revealed that meticulous collaborative planning of a lesson is necessary for a lesson to be successfully presented—"it was well planned therefore it could be done" (R2) and "he planned his time and watched the time to the minute for each phase" (R3). Good planning emerges after great attention to detail is invested in a lesson plan with careful precision in mind. Presenting lessons through the cycles of the LSA and peer teaching with collaborative reflection allows for detailed planning to be implemented resulting in a successfully executed lesson. Fernandez (2005) referred to the long-term, gradual improvement of practices by means of a cyclical process of planning and implementing a lesson.

The analysis revealed further that the pre-service teachers used many teaching techniques that needed to be included in higher education teacher training modules. Open-ended questions were posed to the whole class, and specific questions were posed to targeted learners who were called by name: "I like that enough time was given for the learner to think and then to respond" (R2). Attention was given to the planning and development of the activity sheets that followed Bloom's taxonomy because there were "a large variety of question types and levels of Bloom in the worksheet" (R3). Despite working with Grade 3 learners, "advanced graphs" (R3) and diagrams were used to explain complex concepts simply to the young learners. The pre-service teachers purposefully selected graphs and diagrams that would complement the theme for a clearer understanding. A teaching and learning technique that stood out was how a question was posed, the correct answer (a word) was written on the board, a picture of the answer was put on the board for association, and "the word was emphasised a few times" (R4) through verbal repetition. New content vocabulary was written clearly on a board so that learners could see, read, and remember it. All the senses were used; for example, counting was tapped on the table and said out loud. An effective mobile cut-out insect with pre-set words was added to the board to aid procedural knowledge. The learners took part in an observation exercise where the army worm could be touched while it was eating, and later, a dissection demonstration was prepared. "The learners stayed in during recess to watch the insect eat" (R2), which showed that "they [learners] were so excited showing the lesson was a success" (R4). The photographs, clipart, and drawings chosen for the PowerPoint presentation were applicable to the age of the learners.

It must be emphasised that meticulous planning of the time available for all phases of the lesson ensured that the activities were synchronised with the learners' attention span, given that a "wall clock was visible to all in the classroom" (R2). The wall clock was an additional planning aid that benefited

the pre-service teachers when they presented the lesson in the classroom because “the timing was so good for each phase” (R1). The collaborative planning was clear given that all the pre-service teachers monitored the one and a half hours available for the lesson presentation. One pre-service teacher monitored the progress of each table and signalled to the lead pre-service teacher who presented the lesson to the class when it was time to move on. All activities, for example, the dissections and the removal of wasp larva, were timed. The lead pre-service teacher was confident presenting the lesson, showing control of the lesson pace and interest in all the learners when “he called learners by name and asked them questions” (R4). The analysis revealed that the PowerPoint presentations “could have been fewer with fewer examples” (R4). Despite the lesson being thoroughly planned through the cycles, the conclusion was rushed and a lot of text was read off the screen because of all the examples. The pre-service teachers also planned for and included a reflection at the end of the lesson to show their appreciation and respect for insects. They showed an insect memorial in their hometown emphasising the integral role that insects play in the ecosystem. The pre-service teachers who planned and presented the lesson ensured that all instruments and apparatus for the experiments were present and ready for use, showing how “the well-organised activities” (R1) had been planned.

The analysis revealed that the meticulous planning and presentation by the pre-service teachers allowed for different teaching and learning strategies and techniques to be included in the lesson by the team of pre-service teachers. The teaching strategies identified included self-exploration activities, collaborative learning activities, and learner-centred teaching with focused teacher facilitation: the learners “first worked individually [and] then they could work together” (R4) and “the learners talked freely about what they have experienced” (R2). The pre-service teachers allowed the learners to work individually in pencil and later, corrections were made during the assessment.

The LSA helped the pre-service teachers to develop professionally because the analysis revealed that through thorough collaborative planning and the reflective cycles of the LSA, the team of pre-service teachers re-planned and re-presented a lesson with a variety of teaching and learning strategies (learner-centred, experiential, and cooperative) that they had thought about and re-thought about. The pre-service teachers who collaboratively planned and presented the lesson constantly reflected on their progress. In doing so, they became conscious of their changes to the teaching and learning of the content. Action research involves the whole person to be transformative. The pre-service teachers learned from experience and action by critically reflecting on their experience with others and doing so consciously, intentionally, and purposefully. This change is a deliberate one. The pre-service teachers’ learning and consciousness underwent self-critical change that also allowed others to learn from or as a result of the transformation process (Zuber-Skerritt et al., 2015).

The variety of techniques (Ono & Ferreira, 2010) developed and enhanced the pre-service teachers’ professional teaching skills. For example, comparisons and associations were used to ensure that the learners understood the topic. The slides were well thought out and planned. They showed comparisons to quantify numbers of the vast insect kingdom and types of insects for diversity, and associations, such as “so when a baby is born it goes home, so with insects they also have a home” (R3). The finding is that the LSA can be used in methodology modules for pre-service teacher training in higher education in a structured way. The implementation of teaching and learning strategies and techniques in lessons planned and presented by pre-service teachers can enhance their professional teaching skills through the cycles of the LSA and so promote quality education.

Theme 2: Post-Lesson Reflection Forums

The analysis of the reflection notes from the journal of the Japanese lecturer and the post-lesson reflection discussion between the pre-service teachers, the Japanese lecturer, and the researchers revealed pertinent questions, which are shown in Table 1. The pertinent questions are questions that emerged from the data as important guiding questions for lecturers to use when analysing and discussing a lesson during the post-lesson reflection forum. The significance of the questions is that they focus on the lesson content, the teaching and learning support material (also known as resources), and the classroom culture. Furthermore, these questions ensure that the post-lesson reflection forum leads to a deep analysis of what has taken place in the lesson and pre-service teachers can reflect on their professional development.

Table 1

Pertinent Questions for Lecturers to Use During the Post-Lesson Reflection Forum

Lesson Content	Teaching and Learning Support Material	Classroom Culture
Answer the question and discuss why		
Was the level of content appropriate for the grade of the learners? Was the content presented concisely? Were the questions addressed to the learners easy for them to understand? Was the pre-service teacher's explanation accurate and easy to understand? Was the pre-service teacher's verbal inflection and volume of voice appropriate? Was the communication speed appropriate for the learners?	Were there any defective or damaged teaching and learning resources? Did the pre-service teacher explain the phenomenon to ensure that the learners acquired a deep and thorough understanding? Were the slides easy to read? Did the pre-service teacher answer the learner's questions accurately? Did the learners have enough opportunity to think and answer? Were the learners engaged in activities on their own initiative?	Was the time allocation for the activities appropriate for learning to take place? Was the pre-service teacher assisting at the tables in trouble at any stage of the lesson? Were there any learners who progressed slowly?

The LSA helps pre-service teachers to develop professionally because the cycles of the LSA ensure that they reflect thoroughly, especially where pertinent questions (cf. Table 1) are used. The research yielded pertinent questions used during the lesson cycles that lecturers could use during the critical reflection discussions (Chikamori et al., 2013) to highlight the importance of the post-lesson reflection forum in the LSA. This finding is notable because it can help pre-service teachers to clarify their lesson plan, recognise their strengths and weaknesses in terms of the pedagogical approaches they used, and identify any challenges (Ono & Ferreira, 2010). The contribution of the post-lesson reflection forum is notable because by including the LSA into methodology modules, the LSA can supplement teacher professional development of pre-service teachers in higher education.

The post-lesson reflection forum also brings to the fore the importance of the presence of the team of observers that is crucial in each cycle of the LSA. Following the observation of the research lesson, the critical discussion of the design and implementation of the lesson may be regarded as a contribution to theory building (Posch, 2019). The analysis of the data revealed that the role of the observer and their reflections during the discussion can facilitate awareness of pedagogy and soft skills among the pre-service teachers. For example, good social behaviour practices that can influence classroom discipline were noted by the team of observers who noticed that:

> The teacher's and pre-service teachers' attire is conducive to learning. They looked professional wearing white laboratory coats, dressed neatly, showing teacher-pride, and giving a message across. They project to learners that they can aspire to become teachers, scientists, and a role model in society. (R4)

The team of observers also noted how the informal nature of communicating rules with the learners was effective. Maintaining a positive classroom environment was witnessed when the "classroom rules for the day were communicated to the learners, clearly and briefly" (R1). The constructive pointers reflected on by the team of observers are important for the reflective discussion after the lesson presentation because the feedback from the observers is helpful as a measure of learning to identify strengths and challenges in the lesson in each cycle (Ono & Ferreira, 2010; Wajdi, 2017). The repetition of the cycles allows for repeated reflection, allowing for transformative learning where the teachers reflect on their work through critical discourse (Mezirow, 2003).

The social constructivist nature of the LSA and the collaborative approach thereof to learning is noteworthy for teaching praxis (Engeström, 1987; Greeno & Middle School Mathematics through Applications Project Group, 1998) for quality education when aspiring to achieve the fourth sustainable development goal. The research revealed that working through the cycles of the LSA and its critical reflection component are crucial for shaping cooperative learning in a collaborative, continuing professional development process that forms part of the LSA (Chikamori et al., 2013; Wajdi, 2017).

Limitations of the Study

The research presented in this article has limitations due to the nature of the research. One cohort of pre-service teachers from a university was sampled, making the context very specific. Future research might include a multiple-case study design that includes the entire pre-service teacher cohort, which would mean that a greater number of comparisons would be possible among cohorts with other

contexts. In this research, a cohort of pre-service teachers for Grade 3 was sampled. Further research might consider a general range of grades and disciplines. A longitudinal design could be considered beneficial with regard to investigating the importance of lesson observations and reflection in the LSA in pre-service teacher training. The language of communication (Japanese and English) was a limitation. Despite the presence of interpreters, the nuances may have resulted in a different understanding during translation. Despite these limitations, the data collected and analysed in this study do add to the scholarship.

Conclusion

The purpose of this research was to share how teacher professional development of pre-service teachers in higher education could be augmented by a collaborative and reflective LSA. The LSA has the potential to support teacher professional development through collaborative lesson planning. The sixth lesson presentation by pre-service teachers using the LSA enabled them to plan their lesson meticulously, paying attention to the planning of time and planning for the inclusion of multiple teaching and learning strategies and techniques with meaningful questions addressing the different levels of Bloom's taxonomy. There was time for creative explanations, associations, experiential activities, and comparisons in the lesson, among other things. The pre-service teachers who presented the lesson as a team ensured that the general pedagogical knowledge was mastered. They were able to use a variety of teaching and learning strategies and techniques that enabled the content of the lesson to contribute to transformative learning. Pre-service teachers who worked in teams and used the LSA learnt how to plan and present the phases of the lesson well within a specific time frame. The lesson observed revealed that when a team of pre-service teachers plans and presents a lesson together six times, general pedagogical knowledge and the specific knowledge of the context in which teaching takes place become well defined in lessons. Furthermore, the research allowed the researchers to realise that PALAR's values of participation, collaboration, communication, and community of practice (Zuber-Skerritt, 2015) form part of the LSA, and that the LSA transitions learning through the cycles (Wajdi, 2017). PALAR emphasises the significance of action learning using both individual and group critical reflections (Wood et al., 2015) in PALAR's cyclical processes of planning, acting, observing, and reflecting that are also part of the LSA.

This research is important for the discourse on the professional development of teachers because it revealed that team teaching over multiple cycles has the potential to result in the use of multiple teaching and learning strategies and techniques in a lesson. Through its cycles, collaborative approach, and critical reflection, the LSA afforded pre-service teachers the opportunity to acquire new knowledge and skills that enabled them to develop professionally. The direct implication of this research study is that it is relevant for practitioners in the field of teacher training and LSA research in higher education. The research findings are also applicable to teaching praxis for pre-service and in-service teachers for quality education because the pertinent questions can be used to enrich reflection discussions, which can lead to improved lesson presentations.

Recommendations

Higher education has a role to play in enabling pre-service teachers to design lessons that are exploratory, action-orientated, and transformative to inspire learners to live sustainably (UNESCO,

2014). Considering the findings, the researchers recommend that the LSA should be included in teacher training methodology modules in higher education. The LSA is a powerful tool for teacher training in higher education that enables pre-service teachers to draw critical insight from a collaborative team, and strengthen quality education. The cycles of the LSA can be used to assist pre-service teachers who have been enrolled for one-year qualifications in education, for example, postgraduate certificates of education in South Africa. Pre-service teachers require a lot of support when planning lessons. Team planning and teaching among pre-service teachers will help to build their confidence in the planning and presentation of lessons. The researchers recommend the application of the LSA as a tool to supplement teacher training in methodology modules. It is proposed that a team of pre-service teachers present micro-lessons (12–15-minute condensed lessons, planned and presented by a team) to the rest of the cohort. The team who has planned and presented the lesson will get credit for the lesson and, after the cycles of the LSA have been followed, the same team can get a chance to improve the lesson and present it again to the cohort, followed by a post-presentation reflection forum. Future researchers should investigate how a cohort of pre-service teachers can improve their lesson planning and presentation using the LSA in higher education teacher training.

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