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Pre-service Teachers' Impact on Student Learning: Planning, Teaching, and Assessing during Professional Practice

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Abstract: This paper reports a pilot study to investigate four pre-service teachers' reports of their impact on student learning while they completed a four-week professional experience block. We used Hiebert, Morris, Berk, and Jansen's (2007) framework for teacher preparation to analyse the how the participants planned, assessed and reflected on a lesson sequence. Data collected were the pre-service teachers' learning diary entries completed during the four-week block and an online questionnaire and interview completed at the end of the teaching block. Results indicate that the pre-service teachers struggled to identify clear learning goals for students which adversely impacted their ability to plan their lessons and assess students' learning. Implications for teacher education programs are discussed.

Introduction

Over the past 30 years in North America there has been a great deal of activity around the development of Teaching Performance Assessments (TPA) such as the Performance Assessment for California Teachers (PACT). The PACT was developed in response to government requirements for teacher preparation programs to use performance assessments as one measure in making credentialing decisions (Pecheone & Chung, 2006). It comprises five categories, namely: planning, instruction, assessment, reflection, and academic language. As part of the assessment, pre-service teachers (PSTs) are required to describe the academic achievement levels and learning needs of the students in a class they are teaching. They demonstrate how they have used this information to help students by planning and teaching lessons, assessing students' learning, and reflecting on the effectiveness of their instruction.

A similar agenda is also apparent in the Australian teacher education program context through the work of the Australian Institute for Teaching and School Leadership (AITSL). It is now a requirement of the new national program standards for initial teacher education to include a TPA. However, the interest in the TPA is a relatively recent phenomenon for Australia. As a result, there has been very little research conducted to investigate how a TPA could be designed to develop PSTs' classroom practice and provide evidence of the impact of their teaching on the learning of school students.

The pilot study presented in this paper, referred to here as the Impact Project, addresses this gap in the literature by investigating PSTs' reports of how they planned, assessed and reflected on a lesson sequence with a focus on student learning. The purpose of

the study is to investigate how PSTs develop their classroom teaching practices and competencies using Hiebert, Morris, Berk, and Jansen's (2007) framework for teacher preparation. The framework allows for the identification of the key competencies essential in analysing impact on student learning, concentrating on classroom teachers' practice for planning, implementing and reflecting on lessons.

Literature Review

Reforming Initial Teacher Education Programs

In Australia, recent trends towards evidence-based reforms of Initial Teacher Education (ITE) programs have occurred in an environment of increasing criticism, both in policy documents and in the public sphere, of the quality and effectiveness of ITE programs in preparing quality teachers capable of driving improved student outcomes (Cochran-Smith, 2013; Gilroy, 2014; Mayer, 2014). Characteristically in line with similar reform agendas overseas, national policy solutions in Australia under the auspices of AITSL have seen ITE as "a policy problem" (White, 2016, p. 253). As such they have been subjected to an increasing degree of scrutiny and regulation in the critical role they are seen to play as "key determinants of the quality of teacher education in Australia" (Teacher Education Ministerial Advisory Group (TEMAG), 2014, p. 7). Following recommendations of the *Action Now: Classroom Ready Teachers* by the Teacher Education Ministerial Advisory Group (TEMAG, 2014) commissioned to report on ways to improve Teacher Education, a set of eight Principles for national accreditation (AITSL, 2015) outlined TEP reforms underpinned by an emphasis on evidence, rigour, transparency and partnerships.

Reforms have placed renewed pressure on the provider-school relationship as a key component of effective professional experience, with the TEMAG *Action Now: Classroom ready teachers* report (2014) noting that "Providers, school systems and schools are not effectively working together in the development of new teachers. This is particularly evident in the professional experience component of initial teacher education, which is critical for the translation of theory into practice" (TEMAG, 2014, p. ix) and further that "provider support to pre-service teachers undertaking professional experience has significantly eroded" (TEMAG, 2014, p. 28). Increased support, the Report suggests, can be fostered through "... close working relationships through effective partnerships between providers and schools" (p. 31) in delivering "integrated and structured professional experience" (p. xiv).

Impact on Student Learning

The value of strong professional experience partnerships has long been recognised (Darling-Hammond, 2010; Korthagen, Loughran & Russell, 2006; Loughran, 2010; Zeichner, 2010), particularly given that professional experience is commonly regarded by PSTs as having the greatest impact on learning to teach (Adoniou, 2013). In response to long held criticisms of the practicum as one size fits all, accountability driven programs that fail to allow pedagogical risk taking, critical reflective practices and collegiality (Darling-Hammond & Leberman, 2012; Kertesz & Downing, 2016), AITSL principles (AITSL, 2015) place an increased emphasis on meaningful, sustainable and supportive relationships that can integrate theory and practice to increase depth of student reflective learning. This means a closer alignment of "knowing and doing" (Loughran, 2010, p. 6) within the professional experience which is central to a teacher's strong philosophy, professional identity and to what Fairbanks, Duffy, Faircloth, He, and Levin (2010, p. 162) have called "thoughtful adaptation" in

developing a sense of agency and efficacy in the kinds of decisions they make to facilitate learning.

In conjunction with strong professional experience partnerships, this study responds to the emphasis within recent ITE reforms on greater rigour and transparency in the design, delivery and assessment processes in ITE programs, and seen within the practicum experience in the need for clear evidence of a positive impact on student learning (AITSL, 2015) as key to demonstrating “robust assurance of classroom readiness” (TEMAG, 2014, p. x). This marks a critical shift in emphasis from being on how PSTs teach, to what their learners learn (Darling-Hammond, Moore, 2006; Newton & Chung Wei, 2013; Diez, 2010; Plecki, Elfers, & Nakamura, 2012), or from what Sheridan (2013) has called a shift from an egocentric to a student-centric understanding of teacher effectiveness. While impact on student learning is clearly difficult to measure, as the AITSL principles acknowledge (2015, p.9), the ability to positively impact student learning can be seen to rest on a number of skills and dispositions that are the foundations of “expert” teachers’ skills and practices (Henry et al, 2013). In what Hattie (2012) has described as “visible learning”, understanding impact on learning involves being able to clearly identify and share learning goals, understand the nature of learning taking place from the learner’s point of view, and evaluate learning, thus allowing PSTs to be better prepared to reflect on and learn from their own teaching (Diez, 2010; Hiebert, Morris, Berk, & Jansen, 2007). In terms of evidence of impact on student learning, this calls for a model of PST development that allows the theory-practice and cause-effect relationships between teaching and learning to be examined and evaluated through a systematic analysis of instructional activities (Korthagen, Loughran, & Russell, 2006). Further, the emphasis on inducting PST into a broader view of “communities of practice” with the skills and dispositions for effective collaboration around discussions of teaching and learning, calls for a model of PST preparation that can include supervising teachers and academics in the analysis of instructional activities (Cochran-Smith & Zeichner, 2005; Darling-Hammond, 2006; Vescio, Ross, & Adams, 2008).

The Impact Project responds to AITSL principles and draws on models developed around expert–novice teachers’ differences in seeking to foster among a group of four PSTs undertaking professional experience, the kind of close, strategic analysis of impact on student learning that expert teachers are seen to do (Berliner, 2001; Santagata & Angelici, 2010). As a small-scale pilot study of PSTs in a secondary school with which the TEP is developing close research linkages, the aim is to investigate the effectiveness of a planned instructional intervention by the PST in collaboration with their Supervising teacher. In this, the study focusses on PSTs’ skills in identifying a specific student’s needs, planning the instructional activity in response to these needs, and evaluating the impact on student learning. The outcomes of this close study of a small group of PSTs in one school setting can provide evidence to inform the continuous improvement of teacher preparation in more effectively scaffolding PST towards what expert teachers do, in taking responsibility for determining ways to positively impact their students’ learning (Henry et al., 2013).

Theoretical Framework

Hiebert, Morris, Berk, and Jansen (2007) proposed “a framework for teacher preparation programs that aims to help prospective teachers learn how to teach from studying teaching” (p. 47). The framework is based on the identification of key competencies inherent in analysing impact on student learning, focusing on classroom teachers’ practice for planning, implementing, and reflecting on lessons. The authors note that although these skills comprise the daily routines of teachers, they should be developed in a deliberate and

systematic way to support the professional learning of pre-service teachers. In this way, the framework is closely aligned to the features of disciplined inquiry and critical reflection as proposed by Dewey (1933). The framework emphasises the role of reflective practice in teacher development, particularly when reflection attends to “the relationships between instructional practices and students’ achievement of the intentional learning goals” (p. 50). As they explain, “We propose that assessing whether students achieve clear learning goals and specifying how and why instruction did or did not affect this achievement lies at the heart of learning to teach from studying teaching” (p. 48). Their framework focusses on PST’ ability to analyse their teaching, in “fostering intentional and systematic attention to cause–effect relationships” (p. 49). In this, the framework draws on processes of reflective practice that are specifically focussed on students’ learning and the achievement of specified learning goals within an “instructional episode” (p. 49).

The first skill in Hiebert et al.’s framework concerns the teacher’s ability to specify learning goals for the lesson, which in the present study we refer to as “planning”. Learning goals for instruction need clear and explicit definition so that it is possible to measure the extent to which the students have achieved them. Hence, the pre-service teacher’s ability to specify precise learning goals is crucial because this skill provides a foundation for all of the other skills which follow. Typically, learning goals are defined according to syllabus outcomes and Hiebert et al. note the importance of verbs in describing what students will learn. For instance, if the goal is for students to “understand” a concept, the question arises as to what kinds of evidence could be gathered to determine if the goal has been achieved. Instead, more detailed, subject-specific goals that can be observed and measured are preferred. The authors also note that unintended learning outcomes often arise during a lesson, but this framework focuses on intentional goals as learning to prepare these goals can be done systematically to build competence for teaching.

The next skill in the framework relates to making observations of teaching and learning in order to determine what students learned, which we refer to as “assessing” in the present study. In order to conduct observations that will yield useful information about the achievement of learning goals, pre-service teachers must first recognise that evidence about student learning is critical to assess the effectiveness of teaching. In other words, the novice teachers need to recognise that the effectiveness of teaching is not based solely on the actions of the teacher, but rather on the responses of the students. Hence pre-service teachers must shift from a preoccupation with self to consider their students’ learning. They must also learn to differentiate information that is relevant from that which is not. Knowing what counts as evidence involves deciding which kinds of responses from students are more likely to indicate the extent to which they have achieved the learning goals. For example, students nodding their heads when the teacher asks if everyone agrees with an answer given by another student would not be sufficient to determine their learning. Finally, pre-service teachers must identify key moments from a lesson where useful evidence about student learning can be gathered. To do so, they must draw on their subject matter knowledge and their knowledge of student thinking to discern what examples of student work to collect and how to interpret these as evidence of student learning.

The third skill in Hiebert et al.’s framework focuses on the construction of hypotheses about the impact of teaching on student learning. Importantly, this skill shifts the focus from student responses found in the previous skill to consider the specific teaching events that facilitated or inhibited those responses. Hence the hypotheses are essentially questions about practice that specify cause-effect connections and allow the pre-service teacher to interrogate their teaching by linking it to the specific learning goals for instruction (Skill 1) and the students’ achievement of those goals (Skill 2). Learning and teaching principles that describe the conditions under which specific types of learning are more likely to occur provide a lens

through which to interpret teaching episodes and guide the development of hypotheses to explain whether or not students were able to achieve a particular learning goal. Such principles provide a conduit for an empirically-based consideration of student learning as a key feature of the framework. The authors make a caveat though, noting the complex nature of teaching and the likelihood that connections between teaching and learning are generally only partially understood, even by more experienced teachers. Moreover, no single hypothesis is likely to capture all of the factors which may have contributed to a particular learning outcome. Hence, hypotheses should be regarded more as questions requiring further investigation than definitive answers or conclusions.

The framework's final skill involves applying the previous skills in order to gather information about how the lesson might be improved in future. In our study, we combine this skill with Skill 3 and describe these skills as "reflecting". Such consideration of how to improve the lesson follows directly from the outcomes of the hypotheses generated previously as the cause-effect propositions formed through the operation of Skill 3 suggest possible revisions to the lesson found by employing Skill 4. Hiebert and colleagues note that pre-service teachers may not always have the opportunity to re-teach their revised lesson to ascertain if their new approach resulted in improved student learning. Even so, one can assess the degree to which the arguments the pre-service teacher makes in support of the proposed changes are aligned to key principles for learning and teaching. However, the framework does not espouse a particular theory of learning and teaching, though the authors do acknowledge the importance of theoretical knowledge in guiding the development of hypotheses to link teaching actions with student learning.

Applying the Framework

The strength of this framework is in the way it is centred on student learning and the kind of concrete evidence of that learning which can provide the basis of productive reflection (Davis, 2006). Close and deliberate attention to instructional episodes can encourage PSTs to question their assumptions and identify and evaluate the outcomes of instructional decisions (Davis, 2006; Hiebert et al., 2007). In van Es and Sherin's (2002) model, this attention or "learning to notice" involves (a) identifying what is important or noteworthy about a classroom situation, (b) making connections between the specifics of classroom interactions and the broader principles of teaching and learning they represent, and (c) using what one knows about the context to reason about classroom interactions (p. 573).

To support PSTs within the staged skills approach of the framework offered by Hiebert et al. (2007), this study draws on principles of an integrated delivery through university-school collaboration. As Santagata and Guarino (2012) have shown, close collaboration across school and university settings can effectively support PST through collaborative planning for instruction and analysis of "artifacts of practice". Within a novice-expert model, PSTs can be supported in developing a depth and sophistication of reasoning and analysis that experts are seen to engage in as they move towards "effective reflective practice" (Loughran, 2002, p. 37) in gaining expert skills. As Loughran (2002) argues following his examination of effective reflection, it is not only the ability of PSTs to recognise and understand key issues and concerns in their teaching, but to respond to them in a way that informs forward practice. The important linkages in planning, teaching and reflection between cause and effect, and theory-practice can support PSTs in producing key dispositions centred on student learning (Korthagen et al., 2006; Hattie, 2012). As Korthagen et al. (2006) argue:

When we explore the question of what principles shape teacher education programs and practices in ways that are responsive to the expectations, needs and practices of teacher educators and student teachers, it is our conclusion that close cooperation is needed, not only in the sense of school–university partnerships, but also in three-way cooperation among teachers in schools, teacher educators in universities, and those who are learning to teach (p. 1035).

Method

Participants and Context

An Information Session was held at the University for all final-year Secondary PSTs prior to the commencement of the professional experience placement. The purpose of the session was to explain the requirements of the placement in general and the Impact Project in particular. PSTs could then register for the project via an online database managed by the Professional Experience Office. Nine PSTs volunteered to participate in the project but only four PSTs, three female and one male, returned a signed Consent Form and the data for those four PSTs are reported here.

The school where the project took place is a co-educational, comprehensive government high school in a high socio-economic area of Sydney. The PSTs completed a total of 60 days of supervised professional experience at the school, comprising two blocks (10 days in April and 20 days in July–August) and 30 additional days completed between March and October. The data collection for the present study took place during the 20-day block teaching period.

Selection of Target Student and Evidence of Impact

Prior to the start of the block teaching period, the PSTs consulted with their supervising teacher to make an initial assessment of all students in one of the classes they were teaching. From the results of the initial assessment, they selected one student as a focus for the Impact Project and identified a focus area to meet the student's particular learning needs. The PSTs then planned a sequence of three lessons to address the identified learning needs of the chosen student. The selected student was unaware that they had been chosen and all students in the class completed the assessments and participated in the lesson sequence. PSTs gathered evidence of the impact of their teaching by collecting work samples from the class, annotating the samples from the selected student, and conducting a post-assessment of all students in the class. PSTs also kept a learning diary throughout the four weeks of the block so they could document what they had done and reflect on what they had learned about the impact of their teaching on student learning.

Data Collection and Analysis

Data for project were collected by the second author and included the PSTs' learning diary entries, an online questionnaire completed at the end of the four-week block by the four PSTs and responses from a group interview with three of the PSTs. PST4 was unavailable for the group interview and was interviewed separately. All of the interviews were audio-recorded and transcribed for analysis. The questionnaires and interviews were designed to investigate participants' views about the processes of gathering and using assessment data

and their reflections on the impact of teaching in student learning. There were four learning diary prompts (see Figure 1) and PSTs were asked to respond to each in about 300 words.

Analysis of the questionnaire and interview data occurred first by identifying text relevant to each of the skills in planning, assessing and reflecting that were drawn from Hiebert et al.'s (2007) framework. Next, we applied a content analysis following Auerbach and Silverstein's (2003) four stages in coding to (i) highlight relevant text, (ii) gather repeating ideas, (iii) construct themes, and (iv) construct categories. The categories are presented below as sub-headings in each section of the Results.

There are four diary entries we would like you to make, according to the four prompts below. As a guide, each diary entry should be about 300 words. You can write in dot points, sentences, whatever you prefer. Be concise and focus on the main points you want to make. There is no specific timeline for completing the diary entries – you should make them as you undertake each milestone. It is best if you complete the diary as soon as practicable after each milestone.

- 1. Explain how you identified the learning needs of the student for this project. What did you do and what did you learn about the specific student and what did you learn more generally about how to identify the learning needs of all students?**
- 2. Explain how you used the student assessment data to plan your lesson sequence. What did you do and what did you learn about the specific student and what did you learn more generally about how to plan lessons to meet the learning needs of all students?**
- 3. Did you gather formative assessment data as you taught the lesson sequence? If so, how did you do this and what changes did you make to the lesson sequence in response to the assessment data? What did you learn more generally about how to use assessment data to inform your lesson planning and teaching?**
- 4. What impact do you think you had on the learning needs of the student? How do you know that you did?**

Figure 1: PST Learning Diary Prompts

Results

The results of the pilot study are reported according to the three skills identified in Hiebert et al.'s (2007) model, namely: planning, assessing, and reflecting.

Planning

Hiebert et al. (2007) stress that the ability of PSTs to specify precise learning goals when planning their lessons is crucial. This is because careful planning lays the groundwork for all of the other skills in the framework. Planning involves not only the ability to specify learning goals for the student, but also to unpack them into component goals or sub-goals based on knowledge of the student and of their prior learning. The breaking-down process involves metacognition and subject matter competence in perceiving how to enable students to access and construct the content. Hiebert et al. (2007) underline that this first skill in analysis provides a critical mechanism through which subject matter knowledge affects teaching.

Information Gathering

The PSTs used a variety of methods to identify student needs and interests, though these methods were often informal and were commonly based on classroom observation and discussion with students. For example, this learning diary entry from PST1:

I found that the best way for me to learn about my students and then differentiate was by talking to them and building a relationship based on trust, instead of looking at assessment or class marks. I preferred to collect qualitative data based on the students' thoughts about what they had learned.

Other strategies were also employed to gather information about the students as the basis for lesson planning. PST3 noted in his learning diary that he identified the selected student's learning needs "through looking at a homework task in a Romeo and Juliet unit". PST1 and PST2 reported that they also analysed students' test results to check the validity of her observations of students. For example:

From observing the students in the class, it was evident that they needed more challenging work to engage them in class. Further their mid-yearly exam results also helped with reaching this conclusion. (PST1)

PST4 recognised the value of a collaborative approach in gaining diagnostic information from the supervising teacher. She reported that she discussed her planning with the school's EALD teacher and Learning Support teacher in order to gain further insight into the learning needs of her selected student.

Learning Goals

The PSTs indicated that they used information gathered about the individual student to diagnose needs and design learning goals and materials which they intended to meet those needs. However, the PSTs planning was mainly directed at ensuring higher levels of student engagement in their lessons. For example, PST1 noted the class pattern of higher levels of attention in the morning and afternoon fatigue factors to maintain students' attentiveness during her lessons which influenced her planning:

I had found during my various observations also that he would work best when being told explicitly what to do ... it was hard to have their attention for a long time. I endeavoured to have content and writing heavy lesson in the morning lessons, and in the afternoons, cut and paste activities, video or lap activities. I believe this also worked to suit my particular student because he as often distracted during the afternoon and was able to be more on task during the morning. (PST1)

PST1 also commented on her focus student's need to draw attention to himself by asking distracting off track questions in class. PST1 reported that this observation prompted her to devise a strategy that enabled the student to have an individual chat before class, lessening the need for attention in class. Hence her planning was focused primarily on managing student behaviour as the following learning diary entry indicates:

The learning needs of my student were that he often went off track from classwork. ... He often asked questions unrelated to the task ... by talking with him separately at the beginning of the lesson I gave him a chance to let off some of that unrelated talk, so that it didn't distract the rest of the class. (PST1)

The participants also reported the value of the planning process in being able to focus on the learning goals of each student. As PST3 noted, his input and investment in planning "allowed all students including M to find connectedness in their learning and actively

negotiate and direct their own learning process". As such, PSTs acknowledged that the time they were able to spend in detailed planning processes enabled them to "build skills in differentiating for every student". However, there was no evidence provided by the PSTs of how they had differentiated their planning to account for the range of learning needs in their classes.

So, while PSTs demonstrated a keen awareness of student engagement and the need to manage student behaviour, the discussion of specific learning outcomes was largely absent from their responses. None of the PSTs in the Impact Project study clearly articulated learning goals for their student in precise language. Only PST3 demonstrated some grasp of the significance of specific learning goals when he wrote in his learning diary that he was interested in improving students' creative writing skills so that they could "demonstrate empathy and understanding of the perspectives of others". However, PST3's goals did not include observable and measurable verbs as recommended by Hiebert and colleagues (2007) so it is unclear how he might have determined if the students had achieved this learning outcome. Indeed, the discussion of specific learning outcomes was largely absent from the other PSTs' responses and this had an impact on the ways they used assessment.

Assessing

Hiebert et al.'s (2007) model for teacher preparation programs identifies three sub-skills that relate to the assessment of student learning: recognising the indicators of learning; differentiating information that is relevant from information that is not and; identifying key moments from a lesson where useful evidence about student learning can be gathered. All of these skills rely on the ability of PSTs to specify appropriate learning goals for their lessons (the planning phase). A PST who mastered the above skills would be setting appropriate student goals (knowledge and skill outcomes), identifying indicators/evidence of achievement of these outcomes, and pinpointing appropriate opportunities for the collection of data regarding these outcomes. All of this information would, in turn, be used to reflect on and improve their practice. Evidence from the reflective diaries, survey responses and focus group interviews indicates that the PSTs differed in their ability to demonstrate these key skills. Each of the skill areas are discussed in order below.

Clarity of Goals and Identification of Indicators Evidence

While PSTs demonstrated a keen awareness of student engagement, the discussion of specific learning outcomes was largely absent from their responses. The exception was PST3 who identified early in his learning diary that he was interested in improving students' creative writing skills so that they could "demonstrate empathy and understanding of the perspectives of others". PST3 ensured that his diagnostic assessment strategies aligned with these outcomes. The discussion of learning outcomes, however, was largely absent from the other PSTs' responses.

Given the lack of explicitly stated learning outcomes, it was perhaps unsurprising that none of the PSTs identified *indicators for achievement* when planning their lessons. PST3 went close to identifying indicators in his planning. His diary responses indicate he was aware that the assessment needed to measure creative writing ability and develop students' ability to empathise with others. He did not, however, explain what this empathy might look like in a student's response or unpack the indicators of effective creative writing.

Collection of Evidence and Use of this Evidence to Inform Instruction

The PSTs demonstrated a sound understanding of the range of methods for collecting data about student performance. These methods included both informal strategies, such as classroom observation, discussions with students, and portfolios and more formal approaches, for example, collecting workbooks, class quizzes and tests.

Their understanding of the purposes of assessment was, however, narrow. All of the PSTs were able to explain the need for assessment to *provide feedback to students*. They mentioned the importance of “continually monitoring the progress of students” and the need for assessment to provide feedback and “improve student learning”. PST3 was, for example, aware that assessment and feedback “was necessary to cater for all students” but did not explain why or how this might be achieved.

Only two of the participants were able to explain how assessment data could be used to *inform their practice*. PST3 provided an example of how he used diagnostic assessment data to design strategies: “One example of modifying the lesson sequence in response to the evidence was conducting a mini lesson on the contrasting uses and definitions on ‘its’ versus ‘it’s’, which was identified as a learning need through M’s submitted work.” PST4 used assessment to identify learning needs and to shape practice:

The results from the spelling test revealed the areas of my teaching which excluded students and impeded students’ understanding . . . From these results I made a goal for myself to work on my classroom communication skills and my differentiated instruction.

PST4 went on to explain:

With the knowledge of students’ learning abilities, I planned a sequence of lessons which would differentiate the content for all learners, have a range of assessment ... which would improve the spelling and grammar skills of the student.

Many PSTs said they made changes in response to assessment data, “the evidence I gathered had a significant impact on my teaching methodology ...” (PST4) but they did not explain the link between the desired outcomes, assessment results and subsequent changes. The diary and focus group responses also indicated that the PSTs were unsure what they were targeting with their assessment. Few of the PSTs identified specific knowledge and/or skill outcomes for their assessment. Several stated that they were interested in measuring student “engagement”, “self-regulation skills” and student “confidence”. They did not explain how these variables were being assessed or the impact the data had on their practice.

Reflecting

The PSTs demonstrated a basic level of critical reflection on their instructional practices. Hiebert et al. (2007) argue that “a consequence of focusing on analytic skills is that the centre of teaching expertise shifts from on-the-fly performance in the classroom to preparation and reflection outside the classroom” (p.49). The PSTs in this study reflected more on the immediate classroom interactions rather than being reflective about the relationship between their delivery and that of the students’ achievement.

Constructing Hypotheses about the Impact of Teaching

The diary entries show two of the PSTs displaying this skill to some extent. PST2 and PST3 showed indications of the teacher hypothesising about the connection between their

teaching methodology and student learning. In PST2's diary there is possibly a glimpse of some thought given to cause-effect connections between a teaching activity and its impact on student learning. The teaching activity was "extension work" containing questions that ranged in level of difficulty from "easier" at the beginning to more challenging questions "requiring higher order thinking" (PST2).

The impact on student learning that PST2 noted was that the students "were very engaged and asking questions and discussing ideas with each other". PST3 claimed in his diary entries that his "student samples [of creative writing] ... as well as student responses during class activities" show that his teaching had the impact of "empowering their [the students'] own reasoning and drive for writing creatively: for self-reflection, to make sense of the world, to clarify their own beliefs, develop empathy through taking different perspectives". His teaching method was to assign homework writing tasks "designed to give student choice and autonomy in exploring an area of their choice", and to provide feedback swiftly through "modelling on exemplar examples and passages that needed improvement". PST3 appears to have hypothesised a cause-effect link between giving students autonomy in writing tasks and modelling exemplar writing, on the one hand, with his students' demonstration of self-reflection, empathy, and other qualities valued in good creative writing.

From gathering her composite EALD information, PST4 identified firstly "the areas of my teaching which excluded students and impeded students' understanding and active construction of knowledge". From this, she designed a goal for herself "to work on my classroom communications skills and my differentiated instruction". And finally, "With knowledge of my student's learning abilities, I planned a sequence of lessons which would differentiate the content for all learners, engage, have a range of assessments as learning and for learning and which would improve the spelling and grammar skills of the student."

Transferring Reflections into Further Actions

In relation to the skill of gathering information about how lessons might be improved in the future, all PSTs reflected on their teaching practices and/or student observations. PST1 reflected on her student observations and realised that she did not adopt a teaching approach which could allow students to use various forms of representation for their learning. In her student's case, she reported in her diary "I needed to differentiate even further to be able to prevent his distraction [prevent him from distraction]. I could have used his drawing skill as a way of learning [as a way in helping him learn] as well ...". PST2 and PST3 modified their teaching practices based on their initial tasks; for example, diagnostic tasks or initial reflections on his/her own teaching practices.

PST2 had a quick observation from her initial teaching and came up with revised lesson design for students' active engagement considering diverse ability groups. She gave up an "optional" task based on reflection from working with her two students on provided questions from easy to difficult. Her reflection guided her to move towards the direction of various levels of questions for all students. PST3 reflected on his mini lesson and evidences from students' assignments for ways of improving his lesson sequence based on his students' learning progress and prior knowledge. The initial diagnostic task provided evidence for him to modify mini lessons, which included student's learning needs.

The importance of collecting reflective data on students' thinking throughout the teaching process is necessary as a means to demonstrate the reflective practice as a "process that helps teachers to think about what happened during a lesson, why it happened and could be done next to make it more successful" (Hiebert et al., 2007, p. 50). However, this did not

seem the case for the PST participants in this study—there were brief glimpses of reflections being used to guide lesson adaption but only at a superficial level.

Discussion and Conclusion

This study demonstrates the value of a model such as Hiebert et al.'s (2007) framework that clearly identifies and structures the kinds of complex skills that are the foundations of “expert” teachers’ practices in facilitating and supporting the professional learning of PSTs. The model also effectively highlights the important role that the development of skills involved in planning, assessing and reflecting play in enabling PSTs to make a shift from “egocentric” to more “student-centric” teaching and learning (Sheridan, 2013). In this way, the framework can be seen to correspond effectively with the kind of rigour and transparency sought within recent reforms in the design, delivery and assessment processes in ITE programs, with the emphasis on providing clear evidence of a positive impact on student learning (AITSL, 2015).

The study has demonstrated the benefits of using learning diary entries structured around Hiebert et al.'s (2007) framework in scaffolding and supporting the professional learning of PSTs. The completion of these diary entries provided valuable evidence of the PSTs’ metacognitive skills, beliefs about planning and assessment, and ability to use data to inform instruction. Completing the learning diary entries also appeared to increase the PSTs’ awareness of the key stages of the instructional cycle, from specifying learning goals through to proposing improvements. The approach also prompted them to question why they made particular instructional decisions and evaluate the effectiveness of the strategies they adopted. Consistent with the views of Sheridan (2013), this approach to reflection assists PSTs to shift their focus from themselves and their actions in the classroom (ego-centric approach) to a focus on the effectiveness of their practice and impact on student learning outcomes (student-centric approach). This was seen in the generation of a mindset in PSTs of “how am I going to impact on children’s learning?” (PST4) where the prompts encouraged them to internalise the kinds of processes and expectations associated with expert teachers. These expectations were intended to represent ideal learning outcome destinations, pointing forward to future practice capabilities. We are reminded of the concept of the “future self” proposed in motivation research (Dornyei, 2014) which serves to support the PSTs in striving towards future capability goals and identity.

The results showed positive evidence that the PSTs were capable of engaging many of the skills and competencies identified by the report of the Ministerial Advisory Group (TEMAG, 2014). In the area of meeting the needs of a diverse group of students for example, the recommendations note that “... teachers must be able to personalise learning, assess student progress and have the ability to select appropriate strategies for teaching and learning. Pre-service teachers must also develop the skills to know when and how to engage expert intervention and resources for their students” (TEMAG, 2014, p. 16). PSTs indicated an awareness of the different learning needs of their selected students and different degrees of engagement in learning tasks and motivations in response to particular learning activities. They demonstrated a process of enquiry regarding resources for intervention and showed a developing ability to be flexible in being prepared to modify their teaching in response to learner needs.

While these broad skills were evident, the framework was useful in identifying the gaps in processes involved in planning and evaluating the impact on their selected student’s learning. In the area of planning, the data showed a need for the development of greater rigour among PSTs in identifying specific learning goals and in breaking these down into

sub-goals with forms of assessment aligned with these goals. The lack of rigour was seen, for example, in the emphasis on more affective goals and assessment, such as observations of a student's level of engagement or behaviours and their relationship with the PST, rather than more concrete evidence of learning in assessing impact on learning. As a result, many of the PSTs struggled to identify cause and effect relationships between their teaching and student learning outcomes and few were able to suggest improvements that could be made to their practice. Notably, where more rigour was evident, such as in the use of "mini-tests" of particular skills by PST4, this allowed and encouraged a move from teacher-centric to more student-centric teaching and learning, pointing again to the efficacy of the framework in facilitating this important transition.

The PSTs' difficulties with achieving a high level of rigour and transparency in identifying specific learning goals and assessment also highlights the importance of strong professional experience partnerships between universities and schools (Santagata & Guarino, 2012). Such partnerships accord with TEMAG recommendations for "... close working relationships through effective partnerships between providers and schools" (p. 31) in delivering "integrated and structured professional experience" (p. xiv). As Darling-Hammond (2013) argues, time constraints in collegial supervision often limit the effectiveness of professional learning, and this can prove crucial during critical stages of identifying learning needs and planning interventions. Within this framework, PSTs' reflections pointed to the importance of strong support in linking theory to practice, and in encouraging broader reflection beyond responses to the immediate demands experienced in their classes, which, as Stenberg, Rajala, and Hilppo (2016) have shown, is critical to PSTs linking cause and effect in the rationale behind the ways they teach. The lack of rigour identified in articulating clear goals and demonstrating a deep understanding of formative assessment can represent opportunities for close collegial collaboration in problematising and transforming existing practices. In hindsight, we now recognise the importance of providing supervising teachers with a detailed rationale for the Impact Project and more clearly explaining how they could support their PST through the stages of the project. In doing so, we might have better facilitated the "three-way cooperation" (Korthagen et al., 2006) necessary to support PSTs in undertaking the Impact Project.

The learning diary prompts were closely aligned to the skill in the framework suggested by Hiebert and colleagues (2007) but it seems that further scaffolding could have assisted PSTs to develop clearer learning goals for their students and recognise the need for stronger alignment between their learning goals and assessment practices. For instance, requiring PSTs to detail learning goals and sub-goals and identify specific forms of assessment might have helped PSTs provide more detailed learning diary responses and develop greater insight into their teaching. In hindsight, we may have assumed too much about PSTs' ability to link the theoretical knowledge gained from curriculum and methodology units in their university studies to the classroom practice during professional experience. The results from the Impact Project demonstrate how the activities in these units need to ensure PSTs have a clearer understanding not only of the importance of curricula alignment but also how to enact it in a lesson sequence.

As Initial Teacher Education programs in Australia and abroad respond to a policy context of greater demands for evidence of impact on student learning, structured frameworks such as Hiebert et al.'s (2007) can guide PSTs through the complex processes involved in what expert teachers do and indicate critical areas of skills development. The Impact Project highlights the usefulness of the framework as the basis for a TPA and has identified key areas of potential improvement in order for PSTs to generate more rigorous and specific evidence of student learning, and of transformation in their teaching practices.

The study raises important questions about the capacity of pre-service teachers to make clear and effective connections between learning goals, teaching and assessment of outcomes. The fact that none of the participants was capable of setting clear, measurable goals, tying these to effective instruction, and then assessing the impact on learning is troubling. Some of the connections made by the PSTs were disturbingly naïve, even for novices. This finding reinforces the need for more scaffolding and modelling on the part of teacher educators and supervisors and highlights the need for teacher educators to reflect on their own approach and how they might implement the Teaching Performance Assessment in the future.

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