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REFLECTIVE PRACTICE FOR PRIMARY EDUCATION STUDENTS IN SCIENCE

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Synopsis:

Primary Education students often struggle with the pedagogy of teaching Science. This paper describes the development of and positive effect of introducing a reflective practice to one of their Science teaching assessments.

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Abstract

Reflection is an essential part of learning and teaching practice, yet it is not often formally included in assessments of students of education. Evidence shows that education students are generally not aware of this deficit and do not attempt it themselves, (Schön, 1987), (Biggs & Tang, 2011), (Canning, 1991). *This paper describes the motivation for and results of including a direct reflection activity in an assessment for a group of students undertaking a third year Science subject in a Bachelor of Primary Education degree. The activity was designed by the students, which gave the unexpected added benefit of bonding the tutorial group together, giving them much greater engagement with the activity and a deep sense of the purpose of the activity, to the point where they would suggest augmentations to the assessment. This was a valuable result in itself, along with the success of the reflective component.*

Context

A deficit in reflective practice in Science teaching was identified in final year students in the Bachelor of Primary Education at the University of Notre Dame, Sydney. The students in their final year Science unit give a ninety-minute sample lesson, followed by an oral defense led by their tutor. The tutors conducting these oral examinations concluded that even at this late stage in their education, students were seeing these assessments not as preparation for their almost immediate work life, but as one more hurdle to be jumped. Even if they did feel they could use the lessons they had prepared they wanted to forget them as soon as they had presented and perhaps revisit them if and when they would be used. They were not in the habit of immediately reflecting on how the assessment went, or why they got the mark that they did. In addition, they had experienced a transmissive form of Science teaching in their own school days, in which recall was the main emphasis rather than understanding, so had no practical experience with the much more constructivist pedagogy required of them in their degree. In order to address this issue earlier, tutors had tried offering first and second year students the opportunity to review a video of their simpler trial lesson assessments upon which their final year lessons build. There was a lower than one percent take-up, so this method was abandoned. A focus group of third year students conducted as part of this research confirmed that many of them do not see the trial lesson assessment as something to help them with their teaching, rather as an annoyance to get out of the way as quickly as possible. This paper describes a more successful method for introducing reflective practice to students.

Literature Review

The literature supporting the practice of reflection in teaching is extensive and much of it takes its base from the seminal work by Donald Schön (Schön, 1987), who stressed the importance of context and direction in reflection. He made a distinction between two reflective processes, reflection-on-action and reflection-in-action, the latter occurring on the fly and the former occurring after the event. Later works on reflection-on-action in teaching practice, with which this research project is more concerned, seem to split it into a further two categories. The first is easiest to codify, being a reflection on critical events (for example in going over a work placement journal for business students, case study in (Nightingale, et al., 1996), p.18, or in nursing studies, for example (Horton-Deutsch, 2012). The second is what Biggs and Tang (Biggs & Tang, 2011) call transformative reflection and is harder to pin down. It involves teachers reflecting on their current teaching through the lens of a sound theory of teaching and learning in order to create an improved teaching environment that adapts to changing conditions. That is what this project seeks to achieve.

Examples in the literature also seem to struggle with codifying this aspect of reflection. An example of the lengths researchers will go to is described in Nerantzi and Despard's paper (Nerantzi & Despard, 2014) in which the researchers found their current reflection model (having three academics interview each student for thirty minutes at the end of semester) not working, and decided to throw Lego into the mix. A more successful example is given in (Snyder, 2011) of pre-service music teachers reflecting with their tutor on a video of their practice lessons, which was very time consuming, and not practical for a student cohort larger than about twenty. A more thoughtful analysis is given by (Cimer & Cimer, 2012) who look at the issues of introducing reflective practice into teaching in Turkey, the issues are very similar to the ones we are dealing with in Australia. In Turkey they are also moving from a model of teacher centered learning to student centered, giving rise to the problem of overcoming students' own experience of being taught in a very transmissive manner. Cimer and Cimer cite research to indicate that reflective practice should not be introduced at the beginning of a teacher's education, but later when they have adapted to university life. This supports the decision to implement this project in a third year Science unit, rather than in a first-year course. Cimer and Cimer's conclusion is, along with most other analysis, is that reflection is an important part of teaching, but they don't go in to exactly how it should be incorporated.

What is in common with the case studies cited is that the most successful reflective practice involves not only the practitioner, but also the tutor or mentor and fellow students. That is why the author's proposed model incorporates all three sets of stakeholders in not only the practice itself, but also in its design.

The proposed model fits best with Zeichner and Liston's (Zeichner & Liston, 2013) Academic Tradition of reflection, stressing reflection on subject matter and translation of that subject matter to promote student understanding. All this is is really a restatement of Shulman's Pedagogical Content Knowledge (Shulman, 1987). The other four Traditions of Reflection described by Zeichner and Liston (Zeichner & Liston, 2013) concentrate more on the teachers' beliefs, class composition, social context, is more general and is not how this project will be focused.

Description of Pedagogical Intervention

Introducing formal reflective practice in the final year of a degree is too late, Cimer and Cimer's (Cimer & Cimer, 2012) work shows that first year is too early. The author decided that the Science unit taught in third year of the Bachelor of Primary Science was the best time to trial inserting a reflective module into an assessment. Students complete two assessments during the unit, a written assignment earlier in the term consisting of part of a lesson plan, then in groups of three a presentation of part of that plan as a thirty-minute lesson to the class. The pedagogical intervention was to add a reflection component after the presentation assessment, both to increase the usefulness of the presentation as a learning experience and to introduce students to the practice of reflection. There were presentations every week for the final six weeks of semester.

Methodology

The author was teaching eight tutorial groups of twenty-four students each in the semester in which the research took place, of roughly equal experience and abilities. The decision was made to use one group for the research and the remaining seven groups would be controls.

Preliminary Survey of Tutorial Group

Rather than impose a reflective practice on the students, the author invited the tutorial group to design their own reflective practice to add to their trial lesson assignment. They were asked:

- how they felt about reflection
- whether they practiced reflection at all after assessments, if so what form did it take
- whether they practiced it after their periods of practical experience in real classrooms
- how useful they felt the lesson presentation assessment was to them
- what form reflection should take during their lesson presentation assessments.

The responses were fairly uniform. They sometimes practiced informal reflection on the spot in a classroom or after an assessment, but did not write anything down. If they did write anything reflective after a classroom experience it was because they were expected to by their supervisors. They could not see the point of doing anything more structured after a lesson presentation assessment, because it was already finished and they were ready to move on.

Proposed Reflective Model for Lesson Presentation Assessments

Students were then asked to design a reflection module for the lesson presentations that would be coming up in their unit. They were very clear about what they wanted. This is what was agreed about the reflection module. It would be:

- non-assessable
- verbal
- constructive
- involve the whole class, not just the tutor
- not discussed outside the class

The students then made a pact that feedback would be given and taken in good faith and not taken personally. This was not suggested by the author, they came up with it themselves.

In addition, after every lesson presentation assessment, the author would confirm with the group that this was progressing as they had agreed. The author would share with them observations about their presentation and ask for theirs. This had the advantage of allowing them to feel like the participants that they were, giving them ownership of the project and an interest in its success, and an understanding of what was going on.

Exit Survey

At the end of the project, students were asked to fill in a survey asking for their thoughts on the project. They felt very positive about it and showed an understanding of the aims. They gave the author some constructive feedback on the project, including using a suggestion box for the less forthcoming participants, or a private session for presenters with the tutor after the public session, and a request for training in how to give constructive feedback to weaker presenters.

The author feels very strongly that the decision to involve the students as participants in the research was a major contributor to its success.

Project Outcomes

Data and Analysis

The project worked as intended, a structured, specific reflection activity was added to an assessment that functioned to allow the presenters and their peers to reflect upon a trial lesson that had been presented. The result of this reflection was to push students into viewing their assessments as the seeds of future lessons, and to look at their strengths and weaknesses as a lesson rather than as an assignment marked against a rubric. This conclusion was reached for the following reasons:

1. The author's own observations. The questions being asked by the class and the comments and justifications made by presenters showed that the presentations were being examined as a lesson, rather than as an assessment

to be performed and then forgotten. This went to the very heart of the aims for this project. It was also observed that as the unit progressed both the class and the author were improving our reflection skills.

2. The exit survey showed a very strong indication that the reflection activity was beneficial in students' own presentation (average of 4.75 out of 5 in a 1 to 5 scale where 5 was Very Beneficial) and only slightly less that the activity was beneficial to others' presentations (4.62). Most students commented that the experience had changed how they viewed the presentation and how they would put one together in the future (comments such as "has opened up new ideas", "it made me more aware of what works and what doesn't", "I will consider classroom dynamics", "would think more clearly about why we included certain things in the presentation"). What shone through in the comments was students were becoming aware of pedagogical content knowledge (Shulman, 1987), rather than the straight Science content.

3. Despite the fact that the reflection took place after the presentation assessment, it can be shown that awareness that it would take place improved the quality of the presentations. The graph in Figure 1 shows the difference between written assignment marks and presentation marks. Presentation marks are generally a little higher than written assessment marks, but the research group showed a statistically significant bigger jump than the control groups. The data point closest to the y axis is the average for the control groups, with the bars indicating an error of one standard deviation. The second group is the research group. This demonstrates that not only did the students reflect on their presentation, the activity of reflecting on others' presentations caused them to think about their own in such a way that there was a measurably larger improvement in theirs over the control groups.

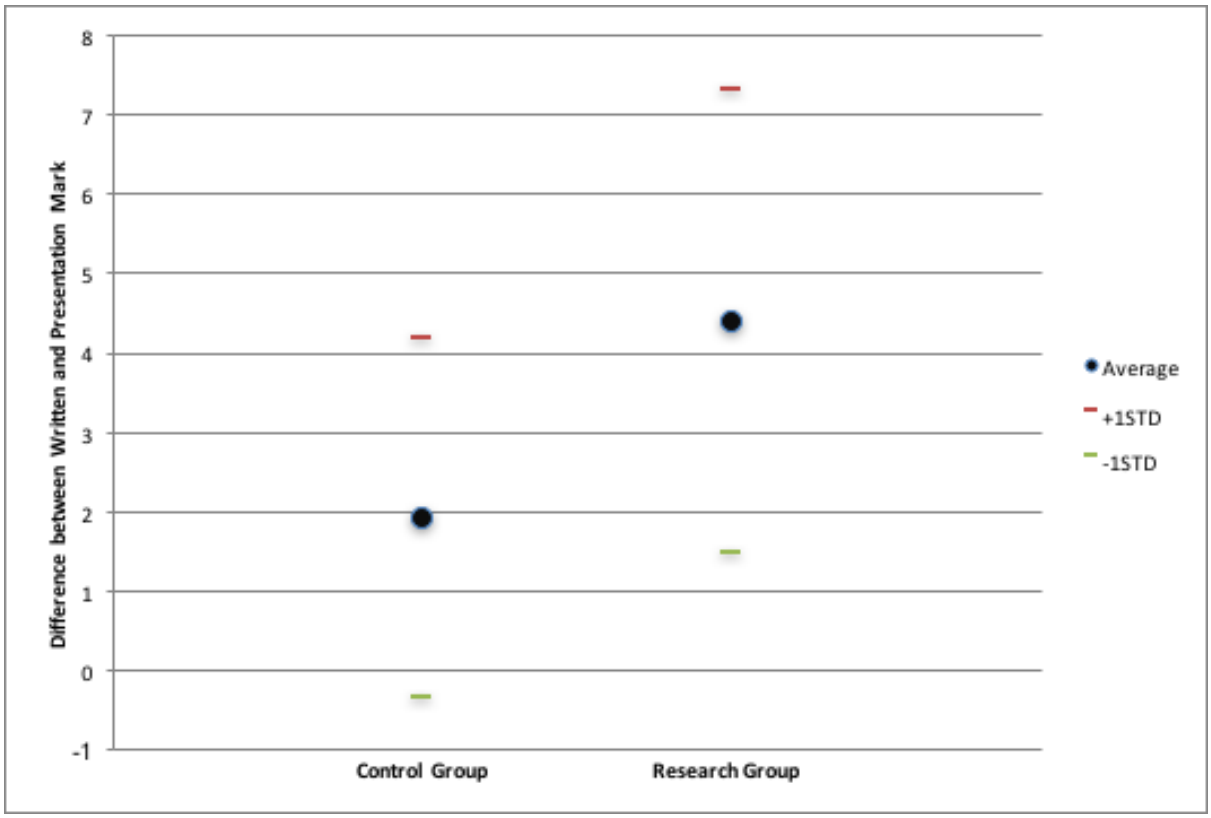

Figure 1. Improvement in presentation mark over prior written assessment in control groups and research group.

Validity

It was hoped that students would find the reflection activity to be useful to them, which makes it more likely for them to make it part of their regular practice. In addition, the reflection exercise occurred every week for six weeks it is hoped that students got into the habit of incorporating reflection into their practice. The exit survey showed that this was strongly the case. It was further hoped that it would cause students to engage with the assessment more deeply, beginning to focus on themselves as teachers, again the exit survey results described above showed this.

In addition to these pleasing results, the graph above, Figure 1, clearly demonstrates that this reflection module has caused students to measurably improve their presentations more than the control group. This result was over and above what was expected from the research.

Additional Outcomes

There were some additional outcomes not anticipated in the planning of this research. They are:

1. Involving students in designing an aspect of their learning causes them to be far more engaged, and in the full unit, not only in that aspect.
2. This involvement early in a semester also has the effect of pushing the group into functioning as a mature group (stages 5 and 6 of Jaque's seven stage model of group development, (Jaques & Salmon, 2007)) much earlier than this author had previously experienced.
3. Students view the presentation assessment completely differently, and allowing them a bit of time after they present to start workshopping it to fit it into a real classroom alerts them to how this can work in a professional setting.
4. The students started peer teaching as they workshopped the presentations, sharing what they had learned in other units or on their practical experience modules.
5. A slightly negative outcome was that the group felt so comfortable with one another that there were some classroom management issues, both for the tutor and, more seriously, for the presenters. The author suggests that this should be dealt with more by training up the presenters to handle this, rather than by moderating the behaviour of the class.

Explanations for these additional outcomes can be found in a guide for this kind of teaching, Learning in Groups (Jaques & Salmon, 2007). Running the focus group the way that is described in this paper forced the tutorial group to move very quickly through the first six stages of group development. The control groups generally only achieved Stage 3 (recognising mutuality and building trust) before the semester ended. This enabled the research group to learn as a group, a different experience to the parallel learning generally experienced in these tutorials. They even began to spontaneously peer teach later in the research, a somewhat neglected resource in higher education in recent years (Goldschmid & Goldschmid, 1976).

Conclusions

There are numerous conclusions to be drawn from this study. The first is that involving students in designing aspects of their assessment causes them to reflect on the content and purpose of their course from an early stage in the semester, with the result that are more engaged in all aspects of their course and prepare more thoughtfully for those assessments (in this case, resulting in higher grades than the control group). This involvement also caused the tutorial group to work more effectively as a team during workshops resulting in a deeper grasp of the course content. Even a short verbal discussion after a presentation style assessment can be an effective vehicle for group reflection, especially if the group has ownership of such a discussion. In this case the reflection exercise suggested immediate improvements that could be made to students' lesson content and delivery, and these suggestions came from

students' peers. It also had the effect of emphasising the pedagogy over the Science content, whereas the control groups were more focused on ticking the boxes of the marking rubric. The author believes that this practice could be highly transferable to other units in the mid-section of a Bachelor of Education, as it was not driven by the Science content of the lessons, but by the pedagogy.

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