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How the six-lens framework supports pre-service teachers' reflections

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Introduction.

The ability to reflect on one's practice is an essential skill for all mathematics teachers because of its significance in promoting effective teaching and learning. Pre-service teacher education (PTE) in South Africa is foregrounding this skill as one way to redress the long-standing record of poor performance in mathematics. This poor mathematics performance is often attributed to poor teaching which result from teachers' inadequate knowledge for teaching mathematics. Reflective practice (RP) is potentially useful for developing this knowledge. A mathematics methods lecturer at a South African university engaged her third-year pre-service teachers (PSTs) in three sessions of video-based lesson analysis to develop their RP for mathematics teaching. She employed the six-lens framework (SLF) developed by Karsenty et al. (2015) to guide mathematics teachers as they reflected on selected video-recorded mathematics lessons. Our research explored how the SLF supported the primary PSTs during the process of reflective practice development. We sought to answer the question: How do the various lenses of the six-lens framework influence how pre-service teachers reflect on video lessons?

Reflective practice and the six-lens framework

Although RP is a difficult concept to define or understand, it has many educational benefits. Scholars such as Dewey as early as 1933 suggested "it is impossible to become and remain an effective teacher without commitment to reflective practice" (p.9). The multiple perspectives on RP however have led to a lack of common definition and furthermore it is increasingly acknowledged that it is a skill that is difficult to develop (Russell, 2005). However, the skill is critically important as teachers reflecting on their teaching regularly tend to improve their own professional practices and adapt to the day-to-day ever-changing teaching demands (Dewey, 1933). In support of developing this critical skill Karsenty et al. (2015) developed the SLF to assist teachers to consider and reflect on six important aspects of lessons, namely: mathematical and meta-mathematical ideas (MMI); explicit and implicit goals; tasks and activities (T&A); dilemmas and decision making (DDM); interactions with the students, and teacher beliefs.

Methodology

The empirical field for the research was three lecture sessions on video-based lesson analysis (using the SLF) provided by a lecturer to her 52 third year PSTs at a South African university in 2017. The lecturer explained each lens to the PSTs before requesting them to use these lenses as they analysed the given video-recorded lessons. We employed a qualitative case study with 19 PSTs who volunteered to take part in the research. All written reflections of these participants were analysed across the three 2-hour lecture sessions. Our poster focuses on the written reflections during the third session where PSTs used all six lenses. We analyzed the reflections of the 14 PSTs who

indicated each lens in structuring their reflections (5 PSTs did not indicate lenses). We analysed the reflections per lens to understand and ascertain how the different lenses influenced the nature and levels of PST reflections. We used content analysis and our four levels of reflection model (adapted from Lee, 2005 and Muir & Beswick, 2007) to analyse and summarise the data. The levels of reflection from first to fourth were Description; Explanation; Suggestion and Reflectivity. We also classified reflections as general (G) or mathematical (M).

Findings and discussions

The 14 PSTs wrote 628 reflections using the six lenses. Table 1 below shows how the reflections were spread over the six lenses and over general versus mathematical reflections.

Table 1 The results of the analysis of 14 PSTs reflections by lens

Lens	Level 1		Level 2		Level 3		Level 4		Total	G		M	
	Count	%	Count	%	Count	%	Count	%		Count	%	Count	%
MMI	116	85%	19	14%	1	1%	0	0%	136	49	36%	87	64%
Goals	64	82%	15	19%	0	0%	0	0%	79	17	22%	62	78%
T&A	128	84%	22	14%	3	2%	0	0%	153	50	33%	103	67%
Interactions	89	82%	18	17%	1	1%	0	0%	108	98	91%	10	9%
DDM	62	83%	10	13%	3	4%	0	0%	75	47	63%	28	37%
Beliefs	63	82%	11		3		0	0%	77	48	62%	28	38%

From the table we noted that some lenses like T&A and MMI attracted more reflections than others and some (e.g. goals, MMI and T&A) tended to lean students towards greater mathematical rather than general focus. Of interest across all lenses PSTs tended to focus on description and explanation rather than suggestion and reflectivity. In the presentation we will talk to some further insights and implications for teacher education.

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