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Open and reflective preservice-teachers in mathematics

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Through both theoretical work and rehearsals on campus, PSTs become accustomed to employing conversational traits in their teaching. As a ReT-Pro practicum teacher, I have participated in the PSTs' implementations and reflections during their practicum sessions. Below are some examples of how PSTs apply talk moves in their enactment during practicum.

I am interested in observing how PSTs utilise this conversational tool during practicum.

The PSTs observed in this article carried out two activities in the subject mathematics during their first year. The first was a quick image activity, and the second involved a sorting task. In year 2, the PSTs performed a 'three-act-task activity'.

It is winter, and the PSTs will soon be ready for their second practicum period. Prior to the practicum, the PSTs have rehearsed their prepared activities. These rehearsals form the second phase of the ReTPro rehearsing cycle, which has already been completed with fellow PSTs on campus.

The objective of the activity, derived from LK20, is for students to arrange numbers, quantities, and shapes based on their characteristics, compare them, and consider whether the task can be approached from varying perspectives. The activity is carried out in a group of four students. They sit around a group table, with the PST leading the session seated at the end.

The PST explains that they will be working on an assignment called 'quick image'. She asks the group if they know what that is. Everyone shakes their heads. She then elaborates, explaining that they will be shown a picture and that the students then need to determine how many symbols it contains. She emphasises that they will not have time to count the symbols, so they will need to use other strategies to find the answer. The PST adds that it might be helpful to use addition to solve the problem. She asks if anyone remembers what addition is. One student responds, explaining that it involves combining several numbers to find the total. She then asks everyone to show the addition symbol with their fingers. The students form a cross with their fingers, and the PST confirms by showing the equal sign.

Once she is confident that the students understand addition, she instructs them to get ready. The students are shown the picture for three seconds. She gives them time to think about what they saw before showing the image again for another three seconds. After the second viewing, the students are instructed to discuss their observations with their partner. The talk move used here is

‘turn around and talk.’ Ample time is provided for discussion, and the PST carefully monitors when to move on to the next step.

With only four students in the group, the PST is keen to ensure that everyone has a chance to share their thoughts and explain how they arrived at their conclusions. The students are actively involved during this phase, listening to each other’s responses. The focus is on how they arrived at their answers, and whether anyone had a different way of approaching the task. There is also space for students to build on each other’s ideas when contributions are made. By concentrating on conversational techniques (i.e. talk moves), the PST remains focused on the mathematical aspects, and has a clear direction for guiding the group.

There is no opportunity to elaborate further or expand on ideas. Upon completion, the PST remarks that she would have preferred a quick image with multiple symbols, as the students quickly arrived at the solution.

After the activity, all PSTs meet to reflect on their teaching session. The PSTs conclude that concentrating on talk moves increases their awareness, enriches the academic discussion, and makes the dialogue more cohesive. They note that they can build upon questions and the conversation itself, and that talk moves are an effective tool.

As a practicum teacher, I observe that even in their first year of practicum, PSTs are already more conscious of whole-class conversations, which help them view solutions from different perspectives.

The second activity involves sorting cards. We are in a 2nd grade classroom with 18 students. The PST leading the activity is a year-one PST currently in week 5 of a 6-week practicum period. The PST has already completed the quick image activity and will now carry out the second enactment. This activity has also been rehearsed with fellow PSTs on campus.

The aim of the exercise is to give students the chance to collaborate and develop their ideas. By working in pairs, they will be able to discuss and reason with one another. Students will sort cards featuring one- and two-digit subtraction problems. They will focus on the competence aim: ‘arrange numbers, quantities and shapes based on characteristics, compare them, and reflect on whether it can be done in several ways.’

The lesson begins with a whole-class discussion about subtraction. Students are instructed to sort the cards by the answers they get. The PST asks if they understand what it means to sort the cards. It is then clearly explained how

the task will be performed. The students are told to sort the cards according to the answers, distinguishing between round numbers, non-round numbers, and problems they are not sure of.

During this assessment, it becomes clear that students are unsure, particularly regarding the concept of 'round numbers', which may be unfamiliar to them. The PST explains the task a second time and uses modelling to help the students grasp how to approach the activity. While the students gain some understanding, the concept of 'round numbers' remains unclear. This is a missed opportunity that the PST does not fully address. Following this, a student is asked to explain the task to the class.

The students then work in pairs, with each pair being given a set of cards to sort. They are allowed approximately 10 minutes to complete the task before a class summary takes place. The students are asked to explain how they arrived at their answers and are encouraged to demonstrate different methods of thinking. Various solution strategies are shared. They imagine a line of numbers in their heads, subtracting the tens and then the ones. The PST illustrates this by drawing money on the blackboard, performing the reverse of a previous calculation, or counting on his fingers. They notice, in good humour, that you do not have 50 fingers, and therefore tens should be used.

Despite the time it takes, the PST ensures that everyone has the chance to participate and expand on their ideas. The students in this session are patient. When a solution does not match, the PST uses additional questions to raise students' awareness, rather than correcting them or focusing on wrong answers. One such question is: 'Can we get a higher answer than the starting point using subtraction?'

The third example to be presented here is from the PSTs' second year of teacher education. Seventeen first graders are all sat together, with the PST conducting the enactment of the 'three-act-task activity', seated in the middle. As the name suggests, the task is divided into three acts, starting with an introduction, followed by an act where students, either with the teacher's assistance or independently, gather the necessary information, culminating in the final act, which is the discussion session.

In Act 1, a real-world situation is used as a starting point, in this case, a short film excerpt. The focus of the exercise is a conversation, in which students are expected to identify the mathematical elements within the scenario and use them to create mathematical tasks. The task form is new and exciting

for the students. The class begins with an introduction, where students are told they will watch a short film and must pay close attention. Their task is to identify quantities.

In the first film, the students see a single balloon floating on a string. After watching the film, the students are encouraged to discuss what they saw. The discussion is led by open-ended questions, with the aim of not influencing their thoughts. The focus of this conversation is to identify the mathematical elements. The first conversation session is brief, and the students prepare to move on to the second act.

Act 2, which focuses on gathering information, begins with another short film excerpt. This time, no introduction is provided before the film is shown. In the film, there are 10 balloons floating, and by the end, several of them burst. After the film, the students are asked, 'What are you wondering about?'. As the students offer suggestions, their questions are written on the blackboard: 'What is it all about?', 'Why are they outside?', 'Who is holding the balloons?', 'Why is it getting dark?', 'How many balloons are there?', 'Why are there so many trees?', 'Why did the balloons burst?'. The PST asks whether it is possible to find answers to these questions. After sorting through the queries, the students are left with one question: 'How many balloons are there?'.

The discussion continues between the students, and they eventually conclude that there are between 0 and 6 balloons. To encourage more solutions, the act concludes with a question about whether any changes to the number range are necessary. When there are no further objections, they move on to the final act.

The third act, which involves finding solutions, also begins with a film snippet. The students are shown the film again and respond with comments such as, 'I think there were 8', 'There were 3 left', 'You could count while they burst', '9', 'I think there were 9', 'I think there were 3', and 'I think there were 10.' To ensure each student has a chance to contribute, sheets are distributed, and they are asked to draw what happened in the film. After completing their drawings, the students are instructed to share and explain their thinking to the class. Throughout the session, the PST focuses on talk moves, encouraging open-ended questions that require the class to think and justify their choices. They also use talk moves such as 'turn and talk', frequently asking if anyone has thought differently. Wrong answers are treated as valuable as correct ones, with plenty of time dedicated to the process. All students are given the opportunity to carefully consider their responses throughout the session.

As a practicum teacher, I find that the PSTs are more reflective, and open to trying out new solutions in practical settings. The PSTs have been able to test the feasibility of the tasks they intended to use. In mathematics, talk moves have been central. Through rehearsing with their peers, PSTs have developed a familiarity with these talk moves, which they subsequently apply in practice.

This increased awareness and reflection also creates a bridge between the practicum school and campus, which we can further develop during mentoring conversations. We share common ideas on how to enhance teaching, leading to more productive discussions for both PSTs and practicum teachers. PSTs know what is expected, making it easier for them to engage, and provide their own reflections.