

# Dialogue with Students as a Valuable Tool in Teacher Inquiry for Professional Development: A self-study of a novice science teacher educator learning about student interaction in biology classrooms

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*Abstract: There is a consensus amongst scholars that learning from student feedback depends on how the feedback is sought and used by the individual teachers. Using Hand and Rowe's (2001) framework of eliciting and using student feedback, the purpose of this self-study was to investigate how I, as a novice teacher educator, can use dialogue with my students to learn about and how to foster student interaction in my biology classroom. I collected data through multiple sources including students' written feedback, my reflective journal, focus-group interviews with the students, and video recordings of my teaching. Data were analysed through a narrative approach. Findings indicate that the continuous dialogue with my students helped me learn about student interaction and fostering it in my classroom through a variety of ways. This study also illustrates that the teacher needs to establish trust with students from the onset such that the dialogue cannot only be of professional value to the teacher but also improve the students' learning. These insights are discussed, and recommendations are made in the article.*

*Keywords: student feedback; dialogue; teacher inquiry; novice teacher educator; self-study, narratives*

## Introduction

In the early 1980s, the use of teacher inquiry as an approach has been acknowledged for its value as it puts forward the teacher as a researcher (Samaras, 2011). Generally, when teachers are involved in any form of inquiry, they engage in reflection to identify a particular pedagogical issue where they plan with the intention of understanding that issue and improving practice (Hall, 2009). Scholars agree that teacher inquiry is a way of fostering professional development as it is systematic in nature and leads to the expansion of knowledge for teaching in specific ways (Golombek & Johnson, 2017). Although teacher inquiry is aimed at improving practice and solving educational issues, these issues impact student learning (e.g. students' concerns about the use of a certain pedagogical issue). Therefore, one of the key characteristics of teacher inquiry is its influence on student learning (Mor et al., 2015). Against this background, the involvement of students in teacher inquiry cannot be underestimated as students make a valuable contribution to the teacher's professional development. In this self-study article, I illustrate how being in dialogue with my students and using their feedback as a basis of my reflection has helped me to learn about and how to foster student interaction in biology teacher education classrooms. The main aim of this article is to extend a conversation around being in dialogue with students as a valuable tool in teacher inquiry to improve a particular pedagogical issue. The key question that I am addressing in this article is: *In what ways does being in dialogue with my students serve as a tool in my inquiry to learn about student interaction and fostering it in biology teacher education classrooms?*

## Context: How it all began

This is part of a larger project where I explore my professional journey of becoming and being a science teacher educator using self-reflexive methodologies like teacher inquiry and self-study (Samaras, 2011). The study emanated from when I was employed at a South African university to teach 3<sup>rd</sup> year Life Sciences content to pre-service teachers on a sessional basis. In this university, a

concurrent model of preparing science pre-service teachers is followed where the students complete both the content and the methodology modules concurrently (See Khoza, 2022). Since it was my first time teaching pre-service teachers, I was not given the whole year. An academic year at this institution, excluding recess days, is made up of 4 quarters with 7 -8 weeks each. I was only allowed to share topics of experienced teacher educators' modules throughout the year. The first topic that I had to teach was the biochemistry of photosynthesis (a part of the biochemistry of photosynthesis and respiration module) for three weeks in the first quarter of the year. The second topic that I had to teach was the human ear (a part of control systems and senses) for a week in the second quarter of the year. The third topic that I had to teach was population ecology for four weeks in the third quarter of the year. Due to my self-reflexivity and a quest to learn, during my last lecture on the biochemistry of photosynthesis, I asked my students to write me feedback on both my teaching and their learning during the lessons. To guide them, I gave them the prompts (1) Comment on how the lectures were conducted and if you understood what was taught, (2) What did I do well? Be specific on the incidents that took place and, (3) What can I improve on? Reading through 73 of 132 written feedback that I received, I began seeing my teaching from the perspective of students. This ultimately became the motivation for this where I investigated how being in dialogue with students helps me learn. In this article, I report on how being in dialogue with my students served as a valuable tool in my inquiry about learning about student interaction and how to foster it in my lessons in quarters 2 and 3. I chose to focus on student interaction because this was common from the students' written feedback.

### **Literature review and conceptual perspectives**

#### **Student feedback and impact on professional development**

Dialogue is generally defined as a 'conversation' between two or more people. In this study, I am using the term dialogue to mean students providing feedback to the instructor on a regular basis while the instructor responds to that feedback (Jones & Hall, 2021). As such, student feedback is a component of dialogue with students depending on the teacher's uptake of that feedback. Student feedback used synonymously with student evaluation in literature is defined as the use of processes where information about students' perceptions of their instructors' practices and the quality of modules and programmes is gathered (Kember et al., 2002; Richardson 2005). A common practice of student evaluation/feedback is when the students are asked using a Likert scale questionnaire to rate their educators on their knowledge, communication skills, their conduct, and other aspects which may affect the teaching and learning of the course. According to March and Dunkin (1992), there are four main purposes of student feedback. The first is to provide feedback to the instructors on their teaching. In this case, the instructors can improve their teaching by looking at what works (or does not work) for their students. The second is to look at how effective the instructor's teaching is. However, this is for the institution's administration. The administration benefits from student feedback as they file for the effectiveness of the courses or modules offered to students. The third is to improve the course such that upcoming students benefit and the fourth is to use the data to research teaching. This article is positioned within the first purpose where student feedback is used for one-self's professional development. While this is the case, there are arguments that Likert scale questionnaires for gathering student feedback do not work for teachers' professional development. There have, therefore, been suggestions by scholars like Ang et al. (2018) and Borch (2020) to change how student feedback is collected and interpreted by instructors. In particular, Kane and Maw (2005) emphasise that the students need to be aware of why they are providing feedback such that the feedback is about their learning and not only about the teacher's teaching.

Not only does student feedback help the teacher to learn but it also gives students a voice. When students provide feedback, they usually focus on, for example, the teacher's pedagogical approaches and assessment practices (Vaessen et al., 2017). According to Flutter (2007), students tend to communicate their concerns, vulnerabilities, and teaching and learning challenges. However, the question of how and whether the teachers take the students' concerns into account remains unanswered. Based on how and when the student feedback is done, it seems that it is not the case that the students' concerns will be attended to. Firstly, the questionnaires are normally administered and analysed and interpreted by the institution's teaching and learning centre then the report is sent back to the educator. It is only those that are self-reflexive who reflect on their practice. Flutter (2007) argues that this approach can perpetuate teachers to overlook the most important aspects of the teaching and learning process: "learners and how they learn best" (Flutter, 2007, p. 345). Secondly, the feedback is usually sought at the end of the course. Despite the argument that this might impact the teacher's practice, only the upcoming cohort of students may benefit, thus, raising concerns about the role of this feedback. An important aspect that teachers need to be aware of when collecting student feedback is the process of collection (Borch, 2020) and the usability of feedback including teacher uptake (Jones & Hall, 2021; Mandouit, 2018).

In this study, I drew from Hand and Rowe's (2001) framework of eliciting and using student feedback. The framework considers collecting student feedback in a structured and planned manner and that collecting student feedback is a continuous endeavour. Teachers can collect student feedback that is planned through questionnaires composed of open-ended questions (Hand & Rowe, 2001). I agree with the authors that the collection of student feedback needs to be planned because it enables one to structure questions that align with the purpose and the knowledge that is being dealt with at hand. In other words, one moves from generic questions to questions that seek to understand what and how students learn and understand the content. Literature suggests that students, in their capacity, as they are the 'consumers' of the knowledge taught, can provide valuable insights in terms of how their understanding of certain concepts has improved. Therefore, the questions asked can be structured in such a way that they are specific to the course (Hand & Rowe, 2001). When interpreted by the instructor, this can lead to improved practice (Gün, 2011). To do this, the ongoing continuous nature of collecting student feedback is about collecting and using feedback as one progresses in teaching (Jones & Hall, 2021). When feedback is sought on a continuous level, one is able to make changes to the current practices where the instructor can change learning activities, this student learning is also improved (Biachinni et al., 2013). In this way, using student feedback is a developmental approach that can result in the teacher's professional development.

### **Student interaction**

Student interaction is conceptualised differently in literature. In this study, I take interaction as defined by Moore and Kearsley's (2011) categories. The first is student-content interaction defined by how students engage and make sense of the content provided to them (Moor & Kearsley, 2011). The content in this case can be in the form of instructional material like PowerPoint presentations. As such, the teacher should present intentional material that affords the students to interact (Khoza & Nyamupangedengu, 2018). The second type of interaction is student-instructor which takes place when the educator communicates with the students (Moore & Kearsley, 2011). In science classrooms, communication can also include the talk (including questioning) that goes together with instructional material like concrete models. According to Bolliger and Martin (2018), students develop a sense of belonging when the educator takes the initiative to interact with them. Also, Khoza & Nyamupangedengu (2018) illustrated that the quality of this kind of interaction is dependent on the instructor's facilitation. In this study, I envisaged that, through inquiry, I would be able to initiate and

facilitate interaction in a variety of ways. Student-student interaction is explained by the ability of students to work collaboratively and exchange ideas (Moore & Kearsley, 2011). The educator's involvement here is important as they need to design tasks that could lead to this kind of interaction. Such tasks are those that require a high level of cognitive engagement such that students can then share their thinking and collaborate on a specific activity because students can cognitively detail, organize and reflect the new knowledge (Khoza & Nyamupangedengu, 2018).

## **Research methodology and design**

### **Self-study**

I employed a self-study as a methodological approach to teacher inquiry. Self-study is a study about one's own actions and ideas where one aims at understanding their practice better and making certain assertions based on evidence (Samaras, 2011). An important characteristic of self-study is that it is self-initiated where a teacher takes a stance to research their practice and improve it (Samaras & Freese, 2006). I used a self-study methodology to understand the role of being in dialogue with my students in my inquiry. According to Samaras and Freese (2006) self-study is constructivist because it is inquiry-based and collaborative. The collaborative nature of self-study results when the researcher involves critical friends. Throughout the study, I had a critical friend – Mike – who critiqued my plan and actions and helped me to reflect on my practice and reflect on my interpretations of the data.

### **Participants**

I was the main participant in this study. The other participant was my critical friend (Mike) who served the purpose of empowering my inquiry (Punch & Oancea, 2014). My pre-service teachers were also participants. These are the 132 3<sup>rd</sup> year Life Sciences pre-service teachers who were registered for the content modules.

### **Data collection procedures and analysis**

I collected data through multiple ways described below:

- Students' written feedback on my teaching: After every one or two lectures, I requested students to provide me with written feedback based using the prompts: (1) How was the student interaction in this lecture? (2) How would you want me to change how I attempt to foster interaction? (3) Provide some general comments on the lecture. On average I got 43 written feedbacks from students after every one or two lectures.
- Students' focus group interviews: At the end of my teaching of population ecology, the students were interviewed in 4 focus groups of 3-5 members each. The purpose of the focus interviews was to get their experiences on my teaching. These interviews were conducted by my research assistant, and they were audio-recorded and transcribed verbatim.
- Informal conversations with students: Throughout the study, I conversed with students. Some would come to my office specifically to provide feedback on my teaching. In such cases, I would seek their permission to audio record the conversation. In some cases, I would talk with students in the corridors and just before and after the lessons. In such cases, I would record what transpired during the conversations, in my reflective journal.

- Lecture transcripts: All my lectures were video-recorded. The purpose was to capture my practice so that I can replay the videos for validation purposes as I was reflecting. I use some of the excerpts from my teaching to support my claims.
- Recordings of meetings with a critical friend: In total, I formally met with my critical friend four times to discuss my interpretation of the student feedback and my response to those. However, in many cases, we would communicate through email correspondence and telephone calls.

In self-study, data analysis takes place as data is collected (Samaras, 2011). To make sense of the data, I employed a narrative analysis as highlighted by Polkinghorne (1995). According to Polkinghorne (1995), there are two ways of making sense of narratives in educational research. In the first approach, the narratives are constructed by the respondent. In this case, the respondents are the students I was teaching. In the second approach, the narratives are constructed by the researcher where the data is transformed to provide an overview of the situation or phenomenon being investigated. In this study, I employed both approaches to analyse, interpret and tell a story. Using this mode of analysing data, I was able to make sense of how being in dialogue with my students serves as a tool in my action research of learning about student interaction in biology classrooms.

### Discussion of insights

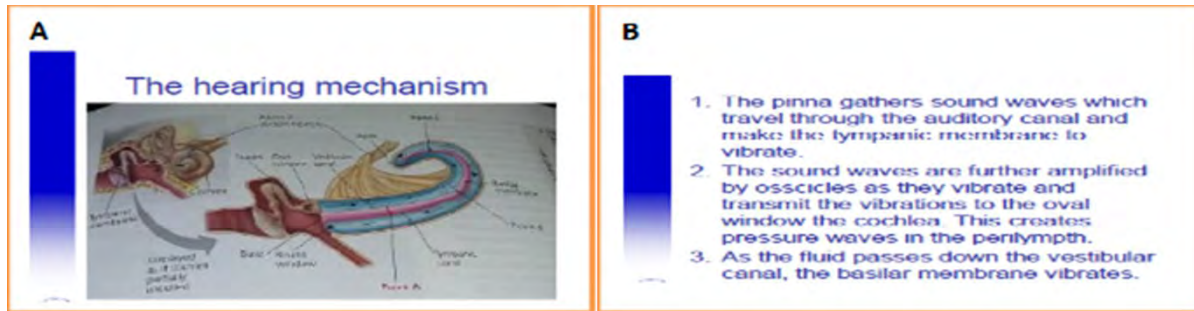
#### **How dialogue with students helped me gain insight into promoting interaction through the use of various instructional material**

Cerlson et al. (2003) describe instructional material as tools that aid the instructor when teaching students. Below, I illustrate how being in dialogue with students helped me learn about and how to use instructional material to foster interaction. I use PowerPoint presentations and worksheets as examples.

Since a PowerPoint presentation is the predominantly used instructional material in higher education (Roblyer & Doering, 2013), when I was planning to teach the human ear, I thought of not only using PowerPoint presentations but also how I need to structure my slides. I held an idea that in Life Sciences, understanding the ‘structure’ is a pre-requisite to learning the functions and processes. I, therefore, opted to structure my PowerPoint presentation in such a way that I show the structure of the middle ear and an explanation at the bottom of that. However, when I was teaching, I noticed that the students respond to the questions without hassles. This was also observed by one student whom I talked to immediately after class and two students who came to my office after the lecture:

- Student 1: Sir, you gave us responses to the questions you asked on a silver platter.  
 Instructor: What do you mean?  
 Student 2: Like every question you would ask, the answer would be on the slide.  
 Student 1: And that became ‘boring’ knowing that answers are already there and in a way, I could not think deeper.

Student 1 notes that my arrangement of slides inhibited him from thinking deeper and this is an aspect of cognitive interaction (Khoza & Nyamupangedengu, 2018). My conversation with the two students confirmed my observation. As such, this kind of dialogue served as a vehicle for my reflection (Borch, 2020) and how I altered my construction of slides going forward. Figure 1 illustrates an example of how I ultimately structured my slides for the second lecture.



**Figure 1. The structure of my PowerPoint presentation in the second lecture on the human ear**

When using the slides as presented in Figure 1, I noticed a difference in the students in the sense that when I asked a question, the students would look closely into the structure of the inner ear and try to respond to the question. It was the interaction with the picture as a visual representation tool (Khoza & Nyamupangedengu, 2018) that helped them to restructure their thinking (Piaget, 2003). For example, I asked them a question on amplification and the oval window, and I had to give them at least a minute to think about the structure of the oval window. I would refer them back to the questions that I had asked when I explain the text that I had written in the subsequent slides (See slides A and B in Figure 1). Some of the written feedback I received from the students after the lecture included the following:

- Student 12: The interaction today was better than the last time..
- Student 28: I enjoyed today's lecture and I learnt how to work with content especially when you are dealing with internal structures. I could even discuss with my peers when we were asked questions.

The students' utterances above indicate the shift in terms of the extent of interaction from the first to the second lecture. Therefore, student-content interaction was achieved (Wei et al., 2019) as gleaned from their feedback. The same students who came to my office after the first lecture came again and confirmed what the other students had stated in the written feedback. My improvement was because I allowed my students to critique my teaching. As Floden (2017) states; student feedback is more beneficial when the educator takes the critiques and views them as learning opportunities. The continuous and perhaps informal verbal conversations with students proved to have a professional value for me as I had improved on my pedagogical practice and this is what Hand and Rowe (2001) advocate for in their model of gathering and making use of student feedback.

In planning for my teaching of population ecology, I thought I had solved how I need to structure my PowerPoint presentations to maximise student interaction until after the first lecture when I deliberately asked a student who had come to my office for a consultation to comment on the lesson. Amongst other things, she referred to the interaction; *"I think our engagement declined from when you were teaching us the ear...I do not know what it could be but that is just my observation, or they are just not enjoying the topic"*. The student was able to comment on this because I had probed her. According to Bijlsma et al. (2019), probing the students to voice out their perceptions of how their teacher teaches often leads to improvement in practice. In this case, my reflection on the conversation with the student helped me understand that fostering interaction through a particular design/structure of the PowerPoint presentation requires the teacher to understand the nature and demands of that particular topic. I realised that a straightforward movement from slide A to B would not engage the students in ways that I envisaged when teaching the topic of population ecology. Another conversation with a student

after the lecture revealed how I can think of using worksheets. In particular, the student had said that in their other course, the educator uses worksheets to engage them. From this, I decided that introducing the worksheet after slide A would be beneficial as shown in Figure 2 below.



**Figure 2. The order of slides in a PowerPoint presentation I used when teaching population ecology with worksheets incorporated**

In this order of slides, I would show a diagram that serves as an aid for interaction about a concept of dispersion. I would use the worksheet that has questions pertaining to a specific concept/main idea (dispersion in this case) for the students to put their thoughts down. The questions on the worksheet with instructions for example “think, write, pair, and share” become part of the PowerPoint slides to serve as a signal to students. In this way, they interacted with the worksheet as a scaffolding tool first. However, these instructions were different for each activity on a specific main idea. Slide C would not be available in the students’ hand-out because it would capture some of the answers to B. The students revealed the following in their feedback after the second week:

- Student 11: I was more engaged in this lecture than the first lecture...what did you do sir?
- Student 20: I liked how you did your worksheets. It is a lesson for me as a future teacher if I want to involve my learners in active learning
- Student 14: When the worksheet said ‘think’, I was thinking and when I discussed with my friends afterward, I was able to understand what they were thinking to compare to mine.

As can be seen in the students’ utterances above, their feedback confirms that their interaction had heightened due to the use of worksheets. For example, Student 14 expressed that the instructions made it possible for her to follow his thoughts which were then discussed with his friends. Again, this is an indication that I was able to understand and learn about interaction and how to foster it because of what the students had raised before. My initiative of asking them to provide me with feedback was a valuable tool for me to learn about the use of worksheets and the instructions accompanying those worksheets. This did not only help me learn but also led to successful student learning (Wisniewski et al., 2019).

I continued with this particular practice in my teaching as the students said it was working for them and during the focus group interviews (focus group 2) the students confirmed that my endeavour of coupling the PowerPoint presentations with worksheets resulted in students not only interacting with the content but also with the educator and their peers:

- Student 1: He would teach something then give us an activity, teach then, something, write an activity. For me, that was exactly what I see as learner engagement, like teacher-learner interaction that I wanted in a lecture.
- Student 2: When we were calculating the rate of increase in populations, my understanding came about when he gave us a chance to work through the example, with a partner on a worksheet.
- Student 3: I think the most interactive part was the worksheet almost after every two or three slides.

The main lesson was that listening to the students' perceptions through dialogue that is context-specific (Borch et al., 2020) helped me understand the role of worksheets as materials that foster the three types of interactions in biology lectures. However, beyond that, I learnt that the worksheets need to form part of the whole lesson as divided into parts instead of being administered at the end of the lecture as some form of assessment of Student 1's utterances that "he would teach and give us something to do" confirms this.

### **Dialogue with students led to my awareness of the role of questioning and discursive moves in fostering student interaction**

#### ***Questions that I initiated***

There was an exchange of questions and answers between me and the students and among the students themselves. When planning for teaching the human ear, I had prepared the questions that I would ask in my lectures without anticipating the possible student responses. At the beginning of the first lecture, just after covering the structure of the middle ear, I asked students the question "*what is the structural and functional difference between the oval and round window as you see in this structure*". All the students kept quiet as they paid attention to the structure displayed on the screen. Despite my efforts of rephrasing the question, I still could not get any response from the students. I assumed that the students did not want to participate. However, the students had to say the following about how the interaction unfolded in the lecture:

- Student 6: What I noticed about you is that firstly, you assume that everybody has got an answer to your questions about the ear which you are to teach. How do you expect students to know what you are currently teaching?
- Student 39: I could not understand many questions, especially at the beginning of the lecture. I got to understand what the questions you were seeking in the middle of the lecture.

It was only after reading their written feedback on my teaching that I realised what was wrong with my approach. My reflections on the students' feedback helped me to realise two things, that there was nothing wrong with the questions and that their silence did not mean disengagement. The questions were not asked at the right time inhibiting them to be part of what I had envisaged would happen – a whole-class discussion. Even though they were not voicing their ideas concerning the questions asked, they were engaging with the question in their minds and their engagement manifested through silence (Khoza & Nyamupangedengu, 2018). Again, their feedback on my teaching was valuable for me to understand this insight about student interaction. This became the basis of my planning for teaching population ecology in terms of questioning techniques.



Instead of only asking the question verbally based on the content, I thought of more general questions at the beginning of the lecture and reserved the content-based questions for the middle of the lecture after covering certain concepts (see the section on worksheets). I relied on metaphors and analogies and examples to phrase my questions. I am showing the following excerpt as at least three students referred specifically to it in their written feedback:

- Instructor: Suppose we are enclosed in here for 2 years and just given enough food and some resources to get us going...we still do what normal human beings would do. What do you think will happen? How will life unfold in those two years?
- Student 1: One thing I know is that we will fight [Laughter from other students]
- Student 2: There will just be too much chaos.
- Instructor: But why would we fight?
- Student 1: We are coming together with varied personalities and we would not get enough resources.
- Student 3: Wait Sir, would the food and resource be increased with time? Like after 3 months, they increase the amount of food given to us?
- Instructor: No, let's say the food does not increase.
- Student 3: What if we make babies? [Laughter from other students] How will we feed them? It will be the survival of the fittest.
- Instructor: Okay, that makes sense. Survival of the fittest how?
- Student 2: Some will even die of hunger and just to add on...those who are strong enough will survive.
- Instructor: Right, so let us take it to population growth... [Educator presents a representation -graph -on the screen]. Look at that and think about what is telling you...what do you see?

A noticeable feature of interaction evident in this excerpt is how I responded to the students. For example, in turn 4, I probed the student by employing a move that Tytler and Aranda (2015) call asking for clarification, and this opened for Student 3 who participated by asking a question. My persistent use of specific discursive moves (e.g. requesting clarity in turn 9) further led to Student 2 explaining what was uttered by student 3 in turn 8. In their written feedback, the students referred to the excerpt above by writing the following:

- Student 7: I think so far, this lecture was introduced in a good way because the question you asked got us thinking and you were patient with us and pushed us by questioning us more.
- Student 29: To be honest sir, I see an improvement in how you engage us. I was able to see how others were curious when you asked them that question of food and all that...

The students' written feedback above indicates that I had learnt about initiating questions at the right time of the lessons. I learnt that starting with a contextualised, general question (see turn 1 of the excerpt) requires them to 'wonder' and predict what would happen in a given situation. Because of the feedback earlier on, I also learnt that how I respond to their contributions, especially in terms of discursive moves (Buma & Nyamupangedengu, 2020) makes a huge difference.

### *Questions initiated by the students*

In science classrooms, students should be encouraged to ask questions for them to learn (Chin & Osborne, 2008). The student feedback shows that they had observed a unique dynamic in terms of my responses when a student-initiated a question for discussion during the lectures on the human ear:

- Student 5: There was a time where X asked you a question and I felt like it was dismissed.
- Student 27: I wish you can also improve on how you respond to our questions when we ask you...some questions are not part of the topic but they link. The question from X also made me curious.

The two students' feedback above became a catalyst for the lessons learnt. I learnt that I denied the students an opportunity to engage with the content in such a way that they link the concepts that they have learnt already and what they were learning at that moment. The following excerpt illustrates what had happened in the classroom:

- Student X: May I ask?
- Instructor: Yes, you can ask.
- Student X: Earlier on when we did the brain, I don't know, they mentioned cerebellum has to do with something like movement, and you say the ear helps us for balance. So, I am confused, maybe there is a connection between cerebellum and cochlea? How so?
- Instructor: I will do that on Friday because today we are only covering the structure of the ear and how it helps us to hear.

As can be seen in the excerpt above, the student sought to initiate a discussion in turns 1 and 3 which could have possibly resulted in student-educator interaction. My response in turn 4 indicates that I was not ready to engage with the students as I thought the concepts were not part of what I was doing. I realised that what was inhibiting me from responding to the students' questions was my unconsciousness of the concepts that were taught before in the course and how these linked to what I was teaching.

In my planning for teaching population ecology, I then constructed a 'map' that served as a 'road map' for me and this led me to think about how I can use concept maps as representations. I decided to use these concept maps at the beginning of every lecture. The concept map would illustrate what we have covered in the previous lecture and how it links with what we would be covering. My students revealed the following in the focus group interviews (focus group 4):

- Student 1: And about student engagement, I like his idea of using concept maps because I could also see how different ideas interrelate.
- Student 2: I know it is a bit challenging to construct concept maps, but I wish we could have been given a chance to construct and maybe present ours, maybe to our friends but the way he introduced his lectures using the maps grasped our attention and one would try to make sense of the map as well as talking to friends.

As can be seen from the students' utterances above, the students confirm how the use of concept maps at the beginning of every lecture helped them to interact. However, what I also learn from

student 2 regarding interaction is that I should have also provided them with the opportunity to construct and present their concept maps could have resulted in student-student interaction. If I had not been in constant conversation with them from the onset of my teaching, I would not have gained such insights about student interaction and I would not have been able to engage in reflection that leads to the improvement of my practice. Evidence for the student feedback as shown above and my learning manifested in the third week of the teaching of population ecology as shown in the excerpt below:

- Instructor: So, as you can see on the concept map there, it shows how the logistic model of population growth illuminates certain kind of interactions. The carrying capacity...[Explanation continued]
- Student 1: Sir, the link between the concepts of carrying capacity, competition and environmental resistance, can you explain that?
- Instructor: What do others think?
- Student 2: I remember in our second year, we covered ecology and I remember Mrs X saying competition can be within species and or different species.
- Student 1: I remember that but what I am asking now is how carrying capacity links to competition and environmental resistance.
- Student 3: Year, I get what you are saying...let me try explaining it... [Student continued explaining].

The excerpt above illustrates how the interaction unfolded as I used a concept map at the beginning of the lesson. Student 1 was able to ask a question in turn 1 because the concept map aided her thinking. My response to her question was relevant because instead of disregarding her question as it included the concept of competition which was to be covered in the lecture to follow, I tossed back the question to spark student interaction. This resulted in student 2 going back to what they have done in the second year (see turn 3) and student 3 explaining his thoughts (see turn 5). As such, not only did the concept map serve as a tool for me to understand links between concepts better in such a way that I can better respond to students' questions, but it also served as a vehicle for student interaction. In the focus group interviews, the students had to say the following about the use of concept maps.

### Learning new approaches

The flipped classroom teaching approach is defined as when the teacher provides students with direct access to video lectures, slides, and other teaching resources on online educational platforms (Bergmann and Sams, 2012). In my inquiry to learn about interaction and how I can promote interaction in my lectures, I learnt about flipped classroom teaching approach as a way of fostering student interaction from the feedback that students provided at end of teaching the human ear as shown below:

- Student 34: I wish we can get the slides beforehand so that we can read through them before coming to class.
- Student 12: I think I would also learn a lot from online discussions, and we can come to the lecture with questions of clarity.
- Student 45: Last year, the educator would give us notes at least a day before and we would go through them, like me, I would also discuss with my friends and come prepared to the lecture.

As can be seen above, the student feedback alludes to aspects of flipped classroom teaching approach. When I was planning my teaching of the human ear, I never thought of it as a driver of interaction in educators. The students made me aware of what I could consider doing to heighten their interaction in the lectures. In this case, being in continuous conversation with my students helped me to learn about an approach that I never thought I would use. This is what Borch et al. (2020) call “unintended learning as consequences of evaluation processes” (p. 87). According to Golding and Adam (2016), acquiring feedback from students is desired as it propels a quest for an academic to strive for improvement. As such, this insight became valuable as one of the pedagogical approaches to try when teaching population ecology.

During my teaching of population ecology, I began to make short video clips (10 min max) where I would explain a concept. In some cases, the short clip was to help students overview what we will do in the practical session. In focus group 1, the students referred to this:

- Student 1: There was a time when he posted a video of him explaining what the practical was about and the procedure, you remember, right? That helped me in preparing for the practical
- Student 2: Yes, and I remember we did not struggle because most of us were prepared, the video was very useful.
- Student 3: I remember watching that video with her [referring to her friend] and we would even go back to lecture slides to refer, I think that was kind of cool for us!

The two students’ utterances above indicate that my approach of posting the video before the lesson/practical did not only make things easier for them but also helped them to interact. For students 1 and 3, the videos helped them to engage with the content whereas, for student 3, it resulted in the interaction between her and her friends – student-student interaction (Moore & Kearsley, 2011). This is an illustration that taking their feedback as shown above and incorporating it into my teaching was valuable. The dialogue with them made a difference in my inquiry.

## Conclusions

The focus of this inquiry was to illustrate how being in dialogue with students served as a tool for my professional development where I was learning about interaction and how to foster it in my lessons. Firstly, continuous dialogue with students in education has professional value (Wisniewski et al., 2019). I was not only able to learn about student interaction but also how to foster that in my biology lessons as I was continuously modifying my approaches to foster student interaction. For example, I learnt about how to construct instructional material that fosters student interaction. Secondly, dialogue with students is a valuable tool to ultimately validate the extent of this development, especially in self-reflexive methodologies – similar to the role of critical friends in self-study (Samaras, 2011). Thirdly, I have illustrated that the practice of both planned/formal and unplanned/informal continuous dialogue with students through a variety of ways (i.e. written feedback after every lecture, verbal conversations in the office, focus group interviews at the end of the course, and informal conversations on the corridors) works for one’s professional development in an inquiry. Asking the students to write a piece of reflection after every week or every lecture has made me continually reflect on my practice and improve it on an ongoing basis to better their learning. However, one must establish an environment where the students can be trusted and can trust the teacher. In my case, I was upfront in terms of my needs and my quest to develop professionally. Due to this trust, the

students were able to suggest ‘new’ ways that I can try to foster interaction (e.g. flipped classroom approach). Therefore, when teachers want to use student feedback continuously to professionally develop themselves, they need to be transparent with the students such that the students can suggest specific pedagogical approaches that help them learn without any fear.

### Recommendations

Although this was a self-study based on one novice teacher educator in a particular teaching context, the insights reported here can be a starting point for teachers to think about ways in which dialogue with their students can lead to their professional development. One interesting insight emerging from this study is that students can serve as critical friends in self-studies. In the past, critical friendship has been conceptualised as having the more knowledgeable other, thus, restricting practitioners to focus on their colleagues. As pointed out by Pinnegar and Hamilton (2009, p. 15), critical friends have a key role of “confirming and disconfirming evidence for our understandings and assertions for action” In this paper, I am arguing that in addition to the colleagues as critical friends, the students that one is teaching can serve the purpose of critical friendship in a slightly different perspective. However, this was not the focus and a suggestion that I am bringing forth is for future studies to look at the extent to which this can be done, the dynamics involved, and how it would be different from the involvement of colleagues as critical friends.

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