Respondent 12 Interview

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**SUMMARY KEYWORDS**

plant, students, science, important, concepts, year, biotechnology, lectures, practical, evolution, deal, field, bot, barriers, question, module, courses, textbook, problem, terms

**SPEAKERS**

Megan Roberts, Respondent 12

**Megan Roberts 00:05**

Have you read through the interview guidelines that I send?

**Respondent 12 00:11**

Yeah, I've got them open here, I think, let me see, yeah. I've had a quick look at them. Yeah.

**Megan Roberts 00:21**

Wonderful. Can you please state your area of expertise or field of research?

**Respondent 12 00:28**

So, crop biotechnology and molecular Plant Pathology.

**Megan Roberts 00:37**

Thank you. So, my first question to you is, is plant blindness or lack of interest in plants a problem in your institution?

**Respondent 12 00:50**

Yeah, well I've obviously been exposed to the plant blindness concept by Prof. Barker. So definitely, people definitely are more interested in animals, and they identify more with animals. So, plant blindness is a problem.

**Megan Roberts 01:04**

Do you think it's a problem, specifically in first year students? Or does it range from first years to final year students?

**Respondent 12 01:16**

Everyone? It's, it's a general concept.

**Megan Roberts 01:22**

Do you have issues getting students to enroll your plant science degrees?

**Respondent 12 01:28**

So, by plant science degrees, what do you mean? Do you mean plant science or you know, the undergrad degrees or postgraduate degrees?

**Megan Roberts 01:40**

Both

**Respondent 12 01:43**

Okay, well essentially, my field is biotechnology. So, the kind of students that need to come into my program are biotechnology students. And so that's interdisciplinary between BGM, microbiology, genetics, and biochemistry and plant science. So, I have, I do have some plant science students who don't have maybe such a strong molecular background, but I think there's not a problem in students coming into biotechnology. But maybe there's more difficulty in attracting plant science students, especially at undergraduate level, there's also a practical problem. The university has got an administrative problem that they've introduced this dual major system, where you can theoretically do two majors. So, you can combine plant science with genetics, plant science, with microbiology, plant sciences with biochemistry. And in the biotechnology the degree is separate. But those dual majors, the students always have to choose a first major. And they always choose, you know, the one of those other courses, not plant science. And so, on paper, the student is a micro student or genetics student or biochemistry student. And I think that's a problem because also on their graduation certificate, it doesn't say dual major just shows... It just lists the modules. Okay, you can look at the detail and see there's a lot of BOT modules in the third year. But the credit doesn't really go to the department. I think, and I think there's administrative problems there. And the university doesn't seem to want to fix that.

**Megan Roberts 03:36**

Do you think that interest plays a role in the reason for students not in enrolling in plant science degrees or plant science models?

**Respondent 12 03:49**

Yeah, I think so, in those dual major combinations, the students tend to choose those other three degrees as their first choice. And that's part of the plant blindness problem, but maybe the perception that they have that there's more job opportunities in microbiology or biochemistry or genetics.

**Megan Roberts 04:12**

Right, then my next question, do you think a first-year plant science module should have a narrow approach covering a few concepts in detail or a broad approach touching on multiple concepts in the field?

**Respondent 12 04:29**

So, essentially, I like the broad approach, you know, because you know, the first-year plant science module definitely needs complete revamping. And so, I like the idea of a completely fresh look, rather than traditional look. The only comment that I've got is that you've got to remember these first-year students who just come out of matric from different backgrounds with different strengths. And so, the current layout of like evolution pathways, blah, dee, blah, seems quite vague. And any student, you know, the module will have to work very hard to kind of like, show how things fit together and how things fit to specific topics, you know, so from an academic point of view, it may sound great to have these kind of broad terms, you know, but you're going to have to somehow indicate that it's linked to plants, you know, so information flow, exchange and storage could apply to computer science, structure and function and could apply to animals, you know, systems could apply to economic, you know, factory management, so, that's my, that's my general comment about those kind of topics.

**Megan Roberts 05:58**

And in terms of covering different fields within banner of plant science, do you think it would be beneficial to include information on say, for example, medicinal plant sciences, agriculture, ecology, biotechnology, like give them a glimpse of all the different things that you can do in plant science? Or would it be more beneficial to focus on certain key concepts such as photosynthesis or structure and function, morphology, anatomy of plants?

**Respondent 12 06:42**

So obviously, the students need kind of some background knowledge of what a plant is, and what it looks like and how it works and how it's different from animals and microbes. But I think that showing the kind of applications and the relevance in first year may be very valuable. Because I constantly have a situation in my third year, plant genetics and crop biotechnology course that I get the comment over and over again, where the students say, I didn't realize how cool plant biotechnology and crop biotechnology is, you know, so. So, I'm going through that now at the moment and this endless of the students who are saying, you’re they find they find this really interesting, and they want to do honors now in that field, so I think if we could, if we could expose them to those, the relevance and the kind of exciting things that are going on, in in those fields, I think that is definitely of value, but you need to obviously make sure that they might not have done biology at school, many of them wouldn't. And so, you need to make sure that there at least know enough kind of knowledge so that when they go into second year with becomes more specialized, they've got the background.

**Megan Roberts 08:00**

Okay, so then my next question has to do with the concepts that we're talking about now. So, if you're looking at them from just a plant science perspective, which of them do you think should be incorporated into a first-year plant science module?

**Respondent 12 08:21**

So, this question four, you know, that whole list of things that you're giving hey? So, it's very difficult to knock any of those concepts because I think they are kind of important, I think, you know, I think they're all important. So, I can't really criticize any of those particular aspects. The one comment that I think I would just want to make, which came to my mind is that in teaching evolution, you know, one has to be one has to be sensitive to the fact that many students, especially in Pretoria, my experience has been, they come from religious backgrounds, and they come from not only, you know, from all cultures, so this is not a limited culture thing, it's from all cultures where there's a very strong religious background where they kind of are kind of, they brought up to, to, to, to, to understand that evolution is not compatible with the Bible or with their religious beliefs. So, if you're going to but obviously in science, we basically use evolution, we consider evolution to be this the structure behind, you know, a lot of biology and that's what we want to teach obviously. So, whoever is teaching that section will have to be sensitive to this and have to be prepared to deal with how the students might react and I think a lot of them just gloss over the students just kind of but if there's going to be a big section all about evolution, you know, I think the course just has to be very sensitive to that and how they deal with that. And I know that I've got I've got MSC and PhD students who are very religious who just like it, they still do the work and they report the reports and they read the literature, all about evolution, evolutionary processes, but they kind of like, they just they just kind of like, you know, they don't kind of believe it, but they just, it's part of the way you talk about stuff. So, they just kind of, don't argue against it or anything like that, but, but intrinsically, in terms of their beliefs is completely and often incompatible. So, so I think a lot of students just deal with it that way at postgraduate level, even. But I think, if you're going to build part of the mindset around that, that has to be done with sensitivity and how you kind of deal with that, you know, I think there's obviously religious but there's obviously, quite a lot of people who are, who are religious, who kind of are able to kind of just not justify, but they are able to kind of like they can incorporate evolution into their religious belief. And then there are many people who feel that way. So, I'm not making any statement about what is right or wrong, but it's something one has to deal with, I think,

**Megan Roberts 11:28**

Are there? Could you perhaps pick a top two of those that you think are particularly important that we need to really cover in first year?

**Respondent 12 11:41**

So yeah, I was I was, I suppose, the second one, pathways and transmission of energy and matter are important, because that's all about, you know, photosynthesis and, and how plants get energy. And then also how they get the nutrients from the soil through the roots, and the whole xylem and phloem. And that whole part of it so, that's probably one, which is really important. The second one is potentially maybe I would say, structure and function, because you need to know the structure of plants. And, you know, the fact that you've got different organs of plants. And the fact that there is this wonderful diversity of like, you know, little miniature little plants, and you've got huge trees. So that's quite important than that. And obviously, our evolution is critically important by understanding genetics. And that's also important.

**Megan Roberts 12:39**

And one would you think, would maybe be left out?

**Respondent 12 12:45**

So, I don't know whether you could leave out anything but so information flow, exchange and storage is about signal at the sub cellular level signal transduction. But also, you know, there is systemic signals, which goes in between throughout the plant. So that potentially, is something which, because the other two things I'm thinking about from like the plant point of view, but systems, I assume you're dealing with, like ecological systems, and that kind of thing. So that almost would be my number two, if you think in terms of ecology and the way plants fit into ecology. I think that's also really, I would almost put that as number two, because that's, that's that I think that's really important in terms of how plants are in the environment, and ecosystem services and things like that, so, so I don't think when definitely must not leave that out. So, in the course, we've got to think carefully about, like, how much do you focus on the individual plants and plant functioning? And how much do you think about the environment that plants are living in, and then their contribution to environment? So, so those would say, that's probably a challenge of the course.

**Megan Roberts 14:01**

Okay, my next question, question five. So, which of the following competencies you think should be incorporated into a first-year plant science module?

**Respondent 12 14:15**

So the process of science in other words, you know, how we do science, we make our hypothesis and we test them with experiments, that should be kind of that's very important in first year to be integrated into animal science, plant science and all, you know, microbiology, whatever, first year courses there are, MLB, or whatever, so, so I don't know whether that's that that should, that shouldn't be that shouldn't be taught in the second semester, that should be they should get that in the first semester, because that's how our science is built on, you know, and so, so basically, the, they should really be exposed to that in the first semester, but it can be reiterated, of course, in in the plant science module, because it's the basis of how you test You know, concepts, maybe it can be incorporated as part of a practical component when you start talking about experiments or something like that, but it's very important. So interdisciplinary and nature science and collaboration. So, in my BOT 161 module where we did small couple of lectures on crop biotechnology or plant molecular biology, which Prof Quinid actually started with, in the old BOT 161. So, so his big point was about, you know, how does plant molecular biologists interact with other types of plant scientists and other scientists. So, I, you know, I developed that concept a bit further and so, so I basically, in my set of lectures which Gerda Fourie's been doing the last couple of years, she's been taking that over, I gave all the notes, I don't know if she's still doing that. But we took a crop biotechnology project like the water efficient maize for Africa. And then I basically went through the water efficient maize for Africa as a as a biotechnology project and demonstrated that if you want to breed maize, which is more drought tolerant, you can you, you can either do it through breeding, or you can do it through crop biotechnology. So, I brought in all the different people that you need in that team. So, you need a plant breeder, you need a plant physiologist, you need an environmentalist you need a food scientist to look at the GM maize, you need a plant molecular biologist. So, you need the whole gumboot for that. So that, that that I and I tried to like, so because the class is very broad, like, and we had a clicker question, of course, you know, what would you like to be, you know, in this team, so I had one slide on the different types of jobs. So, I use that to kind of illustrate that, how in a project like that, it's very interdisciplinary. And there's a lot of collaboration needed to do the project. And it was easy for me, because then I could end up with my maize crop biotechnology project where we worked on fungal resistance, and I could show the photograph of a whole team of like, 30 people, and indicate there's a statistician, there's a data scientist, there's the bio informaticist, there's the breeder, you know, there's a molecular biologist, so that that part of it, I think, can help the students to see how they are how things can fit together. So, I'll say that that's, that's probably quite valuable. But that can be built into sort of your part of the course where you, you give the kind of relevance of the work or the you know, what's going on. So, in terms of communication, that's more What are you talking about? There's like science communication about like writing articles, popular articles about science. I don't know whether that's critical for a first-year module. I'm not sure about that. And then yeah, and so and then integration of science with society, I think, yeah, that that's, that's really important that these students, you know, can be told that look, if you come on to the plant science degree or degree in this field, you could go and work in the quantum agriculture being the GMO office, or you could go and work for Syngenta and being their chemical control department or whatever. So, to illustrate those kind of job opportunities, so yeah, so those are the aspects which I think are relevant. Understanding I see down here is understanding and interpreting data. Yeah, I think that's that is quite useful. That they at least, can work through some, know how to work with some basic data sets. And, and it can equip them because many of them come from matric where it's pathetic, and they don't even know how to like, you know, calculate ratios or averages or you know, do a concentration calculation, you know, of something. So, I think that is that is quite important and that can be built on in in the second year.

**Megan Roberts 19:10**

Would you be able to pick a top two that you think are particularly important?

**Respondent 12 19:15**

in this in this section here. Yes, I think that that concept of interdisciplinary nature of science and the collaboration is probably one of the top tools and integration of science was decided, I suppose, is the next one and then and then also this ability to work with some data, I think is important to kind of illustrate that in the process of science, you know, you have to, you have to interpret you have to calculate data and draw conclusions from what the data is telling.

**Megan Roberts 19:52**

And then one that you think we could potentially leave out?

**Respondent 12 19:57**

I suppose, the communication. Communicating science to society is not so critical. And the collaboration and the interdisciplinary nature's the same thing I would put those together and clearly the process of science underlies it all so you can't take that out, you know that you need to if you do the understand interpret data, you can combine that with the process.

**Megan Roberts 20:21**

Thank you. So, my next question Have you ever heard about vision and change before I contacted you?

**Respondent 12 20:33**

So, so are you talking about, like, vision and change as a kind of, like, teaching philosophy or stuff like that? You know, is it in the context of, because I know what you know, every organization but our vision statement? And, and, and that's so what do you mean by that really?

**Megan Roberts 20:59**

I'm referring to a document that was written by the American Association of science. And it basically draws on which concepts they think should be taught, and which competencies they think should be taught. So that's where the concepts and the competencies come from. Prof Uno, when he was here last year, I'm not sure if you attended those sessions. But he spoke about that a lot.

**Respondent 12 21:33**

Right, okay. Well, I hadn't seen that document or anything like that beforehand. So

**Megan Roberts 21:39**

Okay, my next question, what do you think the barriers to changing the first-year curriculum will be?

**Respondent 12 21:51**

So, you're talking about barriers of the, in the in the staff or in design concept,

**Megan Roberts 22:00**

All barriers, any barriers that you can think of.

**Respondent 12 22:04**

So, I think, in terms of the I think, the department staff are, are on the same page that BOT 161 needs to be revamped. So, you don't have a barrier in concept there. So that so the one barrier is to just make sure that if you redo it, that it can it can articulate with a second-year courses that we already have, you know what I mean that there's not kind of a big gap that you have something and then something completely missing that is required for second year, of course, you can then think about revamping the second-year courses in third year courses as you go along. But in the stage that that's that there will be an important thing to probably think about. And then I think another challenge is deciding what type of textbook to use. And whether you you're going to provide a textbook, at first year level in many ways, it kind of makes a lot of sense to have a textbook for first year students because they've got something to refer to, and then can, you can take examples out of that. If it's if it's otherwise, you've got to write the textbook from scratch, or you know, and then and then and then the advantage of that is if it's kind of an online type of textbook, and then you can always be updated with new examples and stuff like that, then then then that's, that will be the ideal because all the textbooks even most of the things that you're going to find are good European and American examples of like, oak trees and boring things like that. And so, so we need to make a kind of African examples and stuff like that. So that's where you won't find it in a textbook. But I think there is a value in, especially in first year courses to have something a textbook that students can refer to. Otherwise, it's every little module is like just a random collection of background information or just the lectures. And it's difficult for the students that context of what is what is what, what they need to read and understand. So, I'd say that's maybe one of the other barriers. Yeah, I think that's, that's and then obviously the other it's not really a barrier, but a challenge would be is how to design the practical component. That's more challenging now with COVID and with how much we can be in the lab and how much we cannot.

**Megan Roberts 24:37**

Do you have any suggestions as to how we might overcome these challenges or barriers?

**Respondent 12 24:43**

well, of course, as I said, you know, make your own textbook, you know, online kind of online kind of textbook, but which, which, which is a lot of work. You know, it's a lot of it's a lot of work to do that but Maybe something like that would be relevant across South Africa for all universities for first year, plant science, and it said it could be done as a kind of cooperative thing. And so that that's, that's the one thing which could be done. Here, alternatively, you're going to have to have no textbook or cherry pick, you know, from other sources. So, that's the one suggestion, then the other thing is, of course, with the, with the practicals. You know, there's nothing better than a real physical practical, where students really work with material. And, I think historically the botany was about like, traditional stuff of working through the traditional concepts of structures and different types of leaves and, or different types of like, seeds, and pods. And of all these displays up in the old botany department like a museum. Which I think is good, because there's so much cool stuff out there, especially in South Africa, in ecology, and that and diversity. But you've got to make it much more interesting. So, it has to be done in a completely different way. Because I know, there was a massive amount of work, where people had to collect lots of plant samples of flowers and stuff in time for practicals. I never was a student, here, I never did those practicals myself, but I'm sure you can try to make those interesting. Somehow, so. Yeah, so that's, that's some of the practical side.

**Megan Roberts 26:43**

And in terms of lectures, you see them having any resistance to this?

**Respondent 12 26:49**

Well, I think, in general, the lectures don't have, are on board with revamping BOT 161. But I think obviously, the challenge you've got to deal with is balancing workload. You know and it's always good not to have too many lectures in a course, because the students, you know, get exposed to lectures, but then that means it's quite a workload for whoever is presenting the course. You know, so with BOT 161, before, you know, I just, we were five different lectures, I think, who did different sessions, because we were all specialists in those different areas, you know, but that's, that does that does spread the workload and it makes it manageable. Like for me, it is manageable to do that. The just the five lectures or whatever, but in the new system, it you you're going to need to less lectures, I think,

**Megan Roberts 27:50**

what could potentially be a good selling angle for us to motivate people to be willing to take part in the change?

**Respondent 12 27:58**

So, I think, I think another barrier courses, the more traditional botanists and obviously, everyone's, the new people all young now. So they might not have that baggage, but a lot of them would be the older botanist, or Plant Sciences would be concerned that you're, the students are lacking a lot of information or knowledge about some aspects of because if you, if you left up completely, you know, an aspect of plant biology that was traditionally presented, you'd have, you'd have to get over that, that kind of, and we wouldn't really want that we wouldn't want students to come into second year be completely clueless, as to not know how flowers are pollinated. That would be a mistake, you know, so, so but, but basically the bestselling angle of courses is that it’s possible is a potential that it'll attract more students into the plant science degree. You know, and then it could it could, it could, you'd have to use this at schools to, like, encourage them to say, look, this is the cool stuff you'll hear about in, in plant science, but you'd also have to, it will also, there could be some students who to really stick in plant science instead of going into genetics or biochemistry or, you know, other fields. Because it is it's, it sounds very attractive, and it's looks like they're going to get a job at the end of the day.

**Megan Roberts 29:36**

My final question to you is, we'll certainly touch on how important do you think hands on practical sessions are for a first-year plant science course?

**Respondent 12 29:48**

Yeah, okay. That's a good question, because I already mentioned that I thought it was important. But I understand the logistical challenges when you've got 700 800 students, you know, so My thinking about that I can understand how challenging it is for, you know, the department and the fact that I repeat them eight times, you know, the same practical over and over again. So, you're balancing that up against, with the opportunity for students to do something practical, you know, so, so, I can understand a philosophy, which kind of says, okay in first year, we doing no practical stuff, we'll do the practicals and second year and third year. So, I'm ambivalent as far as that's concerned. You know, if you, you know, because even to get the students because obviously, a student would, is always much more excited about doing something when they've got to do it themselves. So, they, if they're sent out, and they might have got to collect different plant parts, that's when I can make a little project and then bring that in. That obviously, I think, was part of the second-year practicals, in the past, is still done. And that's maybe feasible when you've got a class of 100 or whatever, but maybe 800. Class, maybe that's just not practical. So, on that last point. I'm ambivalent, really about what's the best solution.

**Megan Roberts 31:20**

Are there any particular skills that you think are particularly important for a first year to know going up into second year and third year?

**Respondent 12 31:29**

skills, practical skills?

**Megan Roberts 31:32**

yeah, microscopy or lab safety, stuff like that?

**Respondent 12 31:40**

Well, just general, lab safety, I suppose should be dealt with in first year, like, for the for all the BSc students so that when they, if they do no practicals in first year, then then before they start the practical, and second year, they need to do that, you know, so that that's obviously important. skills, like microscopy, I know in MLB whatever, this got this huge microscopy, practical or whatever, which is quite tedious. So traditionally, that was that was important for studying plant anatomy, and things like that, but I can't really think of any specific skills that are absolutely critical for them to know, like, like, you know, how to make an herbarium specimen is probably not essential for second year, you know, maybe that's something they can rather learn in second year, so. So, I think the skills they need to maybe know is to be able to, so maybe a basic skill that could be quite important, is just how to measure stuff. You know, how to measure, measure real things, you know, like plant height, or plant leaf length or something like that and do some basic data analysis may be quite useful for when they go into second year, then there is they know how they, they know, the connection between like, measuring something in an experiment and actually getting data. Whereas if you just give them a bunch of data in the first year and say, Okay, here's the data, analyze it, and work out the average or whatever, then it doesn't have that connection.

**Megan Roberts 33:30**

Okay, thank you. And that's all from my side in terms of questions I have for you. Do you have any comments, or anything else that you would like to add questions for me?

**Respondent 12 33:44**

No, I think that's all. I think I think clearly that what's important is that I know that maybe the plant molecular biology is going to be kind of components can be down scaled, but I think that's that it's really critical that in these in the applications of plant biology, that that's not left out. Because with gene editing and genetically modified crops, and molecular breeding, there are many, many jobs in net in that and that really is the future so we'd be doing a disservice if we didn't expose the students to those concepts, just in broad terms. That that's, that's one thing, which I think is important. And then it can also be kind of a hook to kind of get some students, you know, into the kind of plant biology stream, because they can see that if you've done plant molecular biology, you can go and work as a molecular breeder at a Seed Company. Or you could you know, you can you can work in a gene editing company, those kinds of things so, so, so I think I think those that concept, I think is important. That's just my final comment.

**Megan Roberts 35:00**

Okay.

**Respondent 12 35:01**

All right.

**Megan Roberts 35:02**

Thank you. I'm going to stop recording