

Module: Crop Production 214

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Context

Background overview

Crop Production 214 is an introductory plant propagation module taught to students in the Plant and Soil Sciences programme. The first year of this programme consists almost entirely of Science modules; this module is one of the first that exposes students to the process of using scientific principles and concepts in the applied agricultural environment. Crop Production 214 is presented by the Department of Horticultural Science, with approximately 60 students enrolling each year, although these numbers are rising. Learning takes place through lecture periods (three per week) and through practical sessions. Many of the practical sessions involve field trips to plant propagation nurseries in and around the Stellenbosch area.

Subject area

Crop Production 214 focuses on the general principles of plant propagation. This includes underlying plant physiology, clonal versus sexual plant propagation, the development of cultivars, the use of chimeras and the process of grafting. Most commercial plant propagation takes place in nurseries, where soils and potting mediums, temperature, watering regimes and pest control can be carefully managed by the plant breeders. Nurseries and their environments therefore form an important part of this introductory course.

The challenge

One of the learning outcomes of this course is that, by the end of the course, students should be able to use their knowledge of plant propagation to make decisions about plant breeding processes, such as which potting medium to use and whether to use clonal or sexual propagation. However, there is so much technical information to learn regarding the nursery environment that students were getting lost in the details and not engaging with the content in a critical and problem-based manner. The decision was therefore made to present the plant nursery content in such a way that students would be required to engage with the content and practise going through the information in order to make decisions about the propagation of certain crops.

Advantages associated with the integration of technology

Instead of the lecturer giving lectures on the plant nursery, the students

were asked to use the information available in their textbooks (and elsewhere) to design a nursery for the propagation of three different crops using three different plant propagation techniques. To make the learning more authentic, the students were told that there was an investor wanting to invest in a start-up plant nursery and they were asked to present their nursery design as a business proposal to this investor in the form of a digital movie.

Digital movies were chosen as digital literacy is becoming increasingly important in the agricultural sector and asking the students to create and produce a movie was a good way to teach a number of computer skills. Furthermore, the format of a digital movie required condensing a large amount of information into a concise and interesting script, which supports the learning outcome of being able to sift through large amounts of technical information to make plant propagation decisions.

The lecturer now uses a practical session to teach the basics of making a digital movie and to show students how to find help for technical problems using Google and YouTube. Students also readily help each other with some of the technical movie making. The Department invested in a few microphones and video cameras that the students can use, so that lack of access to devices is not a barrier in this project.

The students are encouraged to use their practical visits to nurseries to engage with plant breeders and nursery managers and to find information and experience that the textbook does not provide.



**Figure 1: Student creating a digital story

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Educational approach

The project was initially designed to engage students with some of the graduate attributes, such as critical thinking, group work and digital literacy. The process of gathering information, making decisions about the nursery and presenting and creating a video also takes students through the levels of Bloom's taxonomy. In recent years, the project has been refined to meet the criteria of authentic learning, such as having broad, fuzzy guidelines, having a real-world setting and being open to the students' interpretations. The elements of digital stories played an important role in the development of this activity, although the emotional aspects were replaced with more scientific and professional elements.

Learning activities

The students are asked to design a plant propagation nursery and to present their design as a business proposal in the form of a digital movie. They work in groups of four to five throughout the project and are given almost the entire semester to work on it. Instead of listening to lectures on nursery design, the students are asked to read the information in the textbook themselves. The groups then choose three different crops to propagate using three different techniques and design a nursery that allows for the propagation of these crops. In this design stage, the students need to make decisions regarding the layout of the nursery, the light, temperature and water control systems, and which potting mixes and nutrients should be used for each crop. They then need to present their design as a business proposal, which includes basic marketing and sustainability. Ultimately, by the end of the semester, each group needs to present its business proposal as a 10-minute digital movie. The groups are expected to create a movie that is professional and interesting but also that clearly and concisely shows their nursery design and explains the decisions that they made regarding the nursery design and environment and how these decisions influence their crop breeding strategy.

Assessment activities

The final movies are marked using a rubric that is available to the students throughout the semester. As the content is vital to the project, content counts for 60% of the mark. The movie elements, including script (i.e. the filtering of information and its presentation), interest, pace and rhythm,

make up the other 40% of the mark.

As this assignment comprises group work, once the video is submitted, the members of each group are given the opportunity to mark their fellow group members on contribution. If more than half a group marks an individual down, that individual's video mark may be reduced after consultation with the group.



Figure 2: Example of a nursery layout and design by Crop Production 214 students

Feedback practice

The students receive feedback through their marked rubrics. In the final practical session of the semester, they are invited to watch all the videos that have been submitted, giving them an opportunity to see what their peers have created and to have brief discussions about each video.

Learning environment

Learning setting

Although this project is done mostly in the students' own time, some of the practical sessions are also set aside for the students to work on the project. One of the first practical sessions of the semester is used to teach students some basic video creation and editing techniques and to show them how to find more help online. Subsequent practicals are used for field trips to plant propagation nurseries, where students can see examples of plant

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propagation techniques and technologies, observe a variety of nursery designs and interact with experts to find out more information.

Content resources

The prescribed course textbook is the primary source of information for the students and can be used as a framework for their project. Additional resources are also made available on the module's SUNLearn page. The students are also, however, expected to find information online and through the nursery field trips. The lecturer is available throughout the semester to help and guide students if needed.

Technology resources

Devices such as microphones and video cameras can be borrowed from the lecturer throughout the semester, who also gives additional technical support if needed. Most students, however, create their videos using cell phone cameras and ask for help from fellow students and online.

Student experience

Student feedback on the learning experience

The students are asked to give feedback on the project using questionnaires that are divided into questions about the learning experience (content engagement), the group work and the technical aspects (the movie). Overall, students agree that they learn more about nurseries through this project than they would by listening to lectures on the topic. They also indicate that they find making the movie technically difficult but that they are all able to create a movie by the end of the semester. And, although they complain about the group work and often work alone, they do also say that they can see the value of working together in groups.

General

Opportunities

Although digital stories have not yet been used extensively in scientific fields, with some modifications, the digital movie format is an effective way to take students through the process of engaging with content and presenting it in a concise way. The students do engage with the information and find the process more interesting than traditional lectures, feeling that they learnt more about the topic than they expected. The movies that are produced are highly creative and diverse and students who are

not academically strong can do well in this project. Many students go beyond the scope of the project guidelines, adapting the project to their own interests. The project is also very authentic in terms of the way that the question is asked, the requirement for a business proposal and the presentation of the work in a format that is interesting.

Challenges

Students do not always want to work in groups, although this has been alleviated by the introduction of the final peer-marking stage. It is somewhat surprising that providing more technical training and support resulted in lower quality projects and the students are now given only very introductory training and then left to make the movies on their own. Many students leave their projects until the last week before the video is due, which does not allow enough time for the learning to take place, and this needs to be monitored more carefully in the future.

Advice

Digital movies can be very valuable in scientific contexts and can be adapted for a variety of uses, including getting students to engage with highly detailed information. Giving students a real-world question and broad guidelines that they need to struggle through increases learning and content engagement (authentic learning). Students require less technical support than expected and often help each other even though technical support from the lecturer is also available.

