

Direct feedback in PBL by summer in winter

Abstract

Crop production science is based on applied plant physiology and ecology. For students to be prepared for a career within this field it is essential to achieve understanding of physiological and ecological processes. This should be based, not only on theoretical knowledge but also on experience from working with plants. "Green fingers", in combination with the ability to explain the processes in plants and plant stands, constitute a solid ground for an agronomist. To offer courses that help students to achieve the "academic green fingers" we propose a concept in which the students will get direct feedback from the plants they grow in the greenhouse. This will enhance their capacity to predict and understand crop production science.

PBL will be a natural part of the course. Student groups are responsible for planning and managing a cultivation to solve a certain problem. An example might be, for how long can a potato plant be kept alive?

They will follow the development of plants in lectures, case studies in PBL and exercises. Since the students will frame their own questions, many different cultivation systems will work in parallel. Results, progress, and problems are followed up in weekly seminars where each student will contribute and learn from all experiments. The feedback from the evaluations will result in a revised maintenance plan and a new prediction that anew will be evaluated. The lecturers involved in the courses will be integrated in the greenhouse work by means of relating their knowledge and information to the problems that the students face. The addition of creative ability in the learning process is true renewal in our teaching. We believe that using this pedagogic model will shift the students' way of learning from something they have been told to something they have derived on their own.

Keywords: Higher Education, Classroom Research, Instructional Innovation, Agricultural skills, Problem based Learning, Feedback



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Abstract

The aim is to help students achieving “academic green fingers”, by introducing *Greenhouse pedagogy*. One purpose is to offer direct feedback from plants on the students’ presumptions. This enhances their capacity to predict and understand crop production science. The students framed the questions and different cultivation systems worked in parallel. The feedback from continuous evaluations resulted in revised maintenance plans and predictions of results that anew were evaluated. The lecturers involved in the courses related their information to the problems the students faced. The greenhouse pedagogy was evaluated by students both orally and written. Also teachers evaluated it and discussed improvements. The work with greenhouse pedagogy will continue at the department, since we find it successful in relation to accomplishment.

Keywords

Problem based learning, greenhouse pedagogy, profession skills

Introduction

When students start taking courses at our department in their third year of studies, they have previously attained basic knowledge in subjects such as chemistry, plant physiology, ecology, soil science and environmental physics. Our main task is to implement this knowledge on different cropping systems. We help the students to put their knowledge into practise in order to obtain a deeper understanding of plant and plant stand processes and their environmental response i.e. the essence of crop production. A major step in this work was to introduce problem-based learning in our courses eight years ago. PBL has given the students opportunity to be more active and set their own “goals of learning” (Silén, 2004). When subjected to PBL, the students occasionally think that they are not learning anything and that it is hard to find the “correct” answers. Our experience has been that they also show difficulties in reflecting upon their field of interest.

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The students in agronomy should be able to meet plant material as well as medical students do meet patients in their clinical education. Since the semesters run from September to May and include little “green time” outdoors we are directed to cultivation in our greenhouses. Being in warm, light and fragrant greenhouses with growing plants of different crops during the dark winter season will definitely improve learning environment. But that is not enough to reach our objective.

The pedagogic challenge for a teacher is, according to Dahlgren (1991) to be able to create conditions for intellectual cross-overs for the student. This project laid the foundation for this by stimulating the students to feel participation and giving responsibility for their learning.

The aim of the project is to help students achieving “academic green fingers”, by introducing *Greenhouse pedagogy*. This is a new pedagogic concept in which the students will get direct feedback from the plants they grow in the greenhouse. This will enhance their capacity to predict and understand crop production science. To fully achieve the integration between theory and practise for the student, the essence of the agronomist profession, living plant material is needed in the education in a more profound way than earlier.

Our intention was to transform the courses in a large case study (PBL) i.e. how do you cultivate different crops, what problems might occur and what to do about them?

Methods

Greenhouse pedagogy was introduced in the two main courses in crop production science given from October to March. During the planning two students were involved to make sure that their ideas were taken in. At the start of the first course students were grouped and introduced to various case studies (PBL). Each group of students got two to three “tasks”. To solve them they had a number of boxes in the greenhouse. The students framed their own questions and a number of different cultivation systems worked in parallel. More specifically, the students studied establishment, growth, development, plant stand factors, plant/weed interactions, allocation, nutrient storage, and quality changes in different crops and analysed and described different sub-processes and their influence/effects on the crops in various ways.

The students maintained their cultivations daily. Results, progress, and problems were followed up in seminars for the whole course every second week. Each student was then asked to contribute and they got the opportunity to follow up all experiments. The feedback from the continuous evaluations resulted in revised maintenance plans and new predictions of expected results that anew were to be evaluated. The lecturers involved in the courses plus especially invited experts were integrated by means of relating their knowledge and information to the problems that the students faced in cultivating the crops.

At the end of the first course we arranged a seminar that finished up what was accomplished during these first ten weeks. Not all students continued to the next course and a few new ones started. The on-going greenhouse projects were introduced to new students and the same groups were kept. The intensity of the evaluations was lowered during this part of the course due to less activity of the plant material. At time for harvest the students were responsible for the work gathering all data needed to answer their questions. A seminar was arranged to

conclude the work and to present the questions, the results and experiences of the work in the greenhouse.

The greenhouse pedagogy was then evaluated by the students in both oral and written course evaluations. A working group at the department have worked with developing the course evaluations in order to improve the questions to facilitate the evaluation. Also the teachers involved have evaluated the greenhouse pedagogy and discussed improvements. At least one representative from the students have been involved in the planning for the next course.

Results and discussion

After work according to the PBL methodology the group presented their experiment proposals to a responsible teacher. The practical ways of the experiments and what processes that would be studied were checked. After that the students started the experiments in the greenhouse and was responsible for the management during the whole course. This part the students appreciated highly. Practicalities, like accessibility of material and teachers, were of very large importance for this to work well. At the same time teachers agreed on being very clear about the students' role and to clearly describe their responsibility according to our aim to increase their identity in their future profession. The students noticed their own development in both skills and group dynamics.

The integration of basic knowledge and crop production science during the courses was a concept we worked a lot with. The course was build around the greenhouse projects as much as possible. Lectures were planned in connection to and lecturers were asked to connect to the development of the crops. The opinion of the students was that the course gave knowledge not only from something they were told but also something they derived on their own. And that was one of the aims of the project, to add creative ability in the learning process. The teachers found it challenging to get it together and worked with their material to suit the new model of pedagogy. Most teachers found it well worth the effort.

To integrate IT in the education at the department was also taken into consideration in this project and each student group have worked with home pages to describe and present their projects. Dynamic modelling was also used in the projects as one way of predicting the results. This integration was hard to motivate to the students since the methodology was hard and time consuming to break through. The majority of the students found it however purposeful.

One difficulty in projects that involve more than one course is to succeed with the passing on of the greenhouse work. Students leave for other courses and do not naturally follow the path of the courses that the administration believes! However, the enthusiasm of the course leaders and fellow students seems to smoothen this transition. And this parameter is very important for this methodology, since the material is growing and needs continual care.

One role of the teacher is to support and challenge the student to reflect up on experiences during the learning process. In this project all the requirements are given by stimulating the students to reflect over the proportion between action and experience, their impressions and knowledge and understanding. The students have found their own efforts, interest and level of ambition as high as the fellow students' and the teachers'.

The responsible teachers have actively worked with creating a high level of, what Uljens (1998) call, pedagogic reliance. However, the demands from the course

leders have in some cases been misinterpreted and apprehended as too harsh. The students have not been used to own responsibility, in such a large extent, as the course leaders believed. This could actually have impaired the learning climate but in the end students have been most satisfied with the greenhouse pedagogy. The work with greenhouse pedagogy, as a PBL process, will continue at the department. We have evaluated the results and find it successful according to what the students accomplish.

References

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