

A Discussion Format for Improving Critical Thinking on Issues Affecting Nursery Management¹

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Abstract

Student discussions included in Nursery Management I (Hort 4041) promote intellectual conflict and, hence, improve critical thinking skills. In these discussions students are offered two viewpoints regarding subjects important to the nursery industry. After writing a short, literature based paper that supports both viewpoints and suggests compromises, students meet in preassigned groups to discuss cohesive ways to defend one of the viewpoints. Groups then present their arguments to the class. Final exams showed that students performed better on test questions based on information attained primarily through discussions, rather than on test sections based on information gained primarily through lectures. Students' comments on the discussion format were generally positive in their written evaluations of the course.

Introduction

Lectures are the traditional method for transferring theoretical nursery management information to students. Many educators believe that lectures tend to be ineffective at enabling students to apply new knowledge (Johnson et al., 1991; Schuch, 2001). Since nursery management professionals must make decisions based on weighing options, the absence of a system that promotes critical thinking about relevant topics results in a clear deficiency that students must overcome when they enter the workforce. It behooves educators to implement information transfer systems that offer students the opportunity to critically assess the knowledge that they have gained through lectures and through their own investigations.

One of the most useful systems available to enable students to think critically about problems is intellectual conflict (Johnson and Johnson, 1997). Intellectual conflict occurs when available information points to more than one correct answer, making a simple choice between two viewpoints impossible. Hoffman and Maier (1972) note that high quality problem solving depends upon intellectual conflict between group members, while Johnson (1970) posits that intellectual conflict is an essential part of

building a valid conceptual structure. Intellectual conflict is most useful in a classroom situation when the assigned task is accomplished cooperatively and when there are at least two well documented positions (Johnson and Johnson, 1997).

Discussions have been used for the past four years to teach Nursery Management I (Hort. 4041). The discussion format that is used was created to promote intellectual conflict and, hence, to enhance students critical thinking skills. There are a number of well documented debates in nursery management that can be adapted to a discussion format (Table 1). Intellectual conflict is supplied by creating a situation where students must discuss and defend the points of view that these debates offer. Allowing students to discuss their views in a group setting has been identified as an excellent way to get students involved with the material that they are expected to learn, increasing both retention and understanding (Smith and Waller, 1997; Johnson and Johnson, 1997).

Methods

Weekly discussions in Hort 4041 are organized to create an environment where students learn to think critically about problems. Conflict and cooperative learning are important components of these discussions. A set of topics has been synthesized for the discussions that included two statements representing alternate sides of an issue (Table 1). These topics are reviewed and updated yearly as different issues affect the nursery industry. All discussion topics are available to students for the duration of the semester at the class website.

The course Nursery Management I has 6 contact hours per week. Labs are taught in a 3-hour block on Wednesdays and the class meets in a classroom on Mondays, Wednesdays, and Fridays for 50 min. On 12 Fridays during the 15 week semester, students participate in a discussion instead of a lecture. For every discussion each student is required to write a paper, not less than one full page, that includes three sections: One section supporting side one of an issue, one section supporting side two of an issue, and one section that produces some kind of compromise between the sides. Students are also required to use a

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minimum of two sources, which may include university-based web pages, to support their statements. Every Friday, students bring their completed papers to class and arrange themselves into one of three pre-assigned groups (five - six students per group) that are randomly assigned at the beginning of the semester, and in which the students remain for the duration of the semester.

At the beginning of the class period, one group is assigned each of the two opposing sides to defend, and the third group is asked to come up with three questions to ask each of the other two groups in order to expose potential problems or weaknesses with the positions presented. The group asking questions is rotated weekly. The groups are given 30 minutes of the class to discuss the issues within their group and to come up with cohesive ways to defend or discredit the given positions. During the final 20 minutes of the class one student, chosen randomly at the end of the 30 minute group discussion by the instructor through a random draw of names from a hat, presents the arguments regarding why that group's position is correct and the other position incorrect. After each of the two groups defending finishes, members of the third group ask questions elucidating problems with the side that has just been presented. The third group also announces a "winner" at the end of the class period and provides reasons why the winning group presented a more cohesive argument.

Students are graded on each discussion based

upon their ability to find information on topics and their ability to support both sides of the argument in the paper that they write. Each discussion is worth eight points for a total possible of 96 points at the end of the semester. This constitutes approximately 25% of the total grade. After the first week, students rarely score less than a seven out of eight on any discussion. Most scores less than seven occur because the student does not indicate references. Attendance for discussions is rarely under 90% and tardiness is also rare. Failure to show up for a discussion results in a zero for that discussion.

Results and Discussion

This discussion format encourages students to think critically about problems in a variety of ways. Since students do not know which side of the argument they will be defending prior to class, they are forced to thoroughly research and understand the benefits of both sides presented in the discussion. In addition, the feedback from the small groups to each individual student within that group allows students to assess their own understanding of the topics presented. Group participation is always excellent all members of each group volunteer information. Hypothetically, students do not know which group member will be assigned the task of presenting their group's arguments prior to the group discussion. Discussions are usually not heated, but students do have a tendency to argue tenaciously for their viewpoint, this is especially true of the political discussions in weeks five and ten (Table 1). Consensus among viewpoints within and between groups is rarely reached, but students do exit discussions having a more thorough understanding of the issue and at least appreciate that there is more than one possible answer or solution to a problem.

At the end of this class students are tested using a final. The format of the final is multiple choice (about 30% of the test) and short discussion (about 70% of the test). To determine how effective this discussion format was for helping student learning, the final for this course was analyzed for questions that were based primarily on discussion topics and for questions that were based primarily on lecture in 2001 and 2002. Percentages of questions taken from discussions were 25% and 23% respectively for 2001 and 2002. Students (n=16 in 2001; n=14

Table 1: Nursery Management I (Hort 4041) topics that students contrast and defend in weekly discussions (Topics listed are from fall semester 2002).

Discussion	Side One	Side Two
1	Brand new nurseries should specialize in container production.	Brand new nurseries should specialize in balled and burlapped stock.
2	Starting a hydroponic nursery would make some enterprising person a fortune.	Only a fool would start a hydroponic nursery.
3	The best way to propagate plants for the nursery industry is tissue culture.	Seeds are the best way to propagate plants for the nursery industry.
4	A city in a southern state is the best site for a nursery.	A countryside in a northern state is the best site for a nursery.
5	Voting Republican is best for nursery owners.	Voting Democratic is best for nursery owners.
6	It is a good idea to wrap trees over the winter.	It is a bad idea to wrap trees over the winter.
7	A container media of 100% peat is the best option for a nursery media.	A container media of 100% rice hulls is the best option for a nursery media.
8	Overhead irrigation is best.	Drip irrigation is best.
9	Liquid fertilizer is the best option for the fertilization of container grown plants.	Granular fertilizers are best for container grown plants.
10	The current governor has been good to the nursery industry.	The current governor has been bad to the nursery industry.
11	Pesticides are always necessary for producing ornamental stock.	Pesticides are never necessary for producing ornamental stock.
12	The web is the best place to publish new information affecting the nursery industry.	A trade magazine is the best place to publish new information affecting the nursery industry.

A Discussion Format

in 2002) scored an average of $91.3 \pm 12.6\%$ (standard deviation) and $83.5 \pm 2.1\%$ in 2001 and 2002 respectively on discussion based questions while they scored an average of $69.5 \pm 12.1\%$ and $78.7 \pm 5.8\%$ in 2001 and 2002 respectively on the remainder of the test. It is impossible to attribute the increase in scores on questions based primarily on discussions solely to the discussions, since many of these topics are covered in other courses. Nonetheless, students did perform better on questions that were based on information that they were forced to think about for discussions.

Over the last four years that this discussion format has been used, a total of 55 student evaluations were compiled (60 total students). Any assessment of the discussion format on these evaluations was unsolicited. Of the evaluations collected, seven had favorable comments regarding this discussion format while only one had a negative comment. This dearth of negative comments regarding discussions indicates that students are willing to write and participate in the discussions and do not feel that it constitutes an inordinate amount of work. It is suspected that students do not mind the additional work because they see an increase in their knowledge of pertinent issues, as well as their grades, due to the discussions.

The discussion format outlined above promotes learning and encourages students to acquire facts and to subsequently arrange these facts into cohesive arguments, thereby honing their ability to critically analyze problems. The performance of students on test questions related to discussions and student evaluations indicates the usefulness of these discussions. The extent to which these discussions should be used in a class, however, must be determined by

the needs of that particular class. This discussion format provides students an opportunity to learn to think critically about problems and to practice their fact finding skills, it does not, however, provide a time-efficient way to convey large quantities of non-debatable information to a class. Any instructor considering this discussion format should assess whether the learning objectives of the course that they instruct is primarily concerned with the transfer of non-debatable information or critical thinking before deciding whether or how often this discussion technique should be used.

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