Chapter 13
Traditional Teaching and Its Effect on Research-Based Teaching:
Science via Online Instruction

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EXECUTIVE SUMMARY

Land-based institutions that use traditional teaching methods have very well documented methods for providing students with the necessary skills, experience, and knowledge for becoming extremely productive scientists in different research areas that are traditional (chemistry, biology, and microbiology) and interdisciplinary (biochemistry, bioinformatics, and computational chemistry) in nature, and they have very few problems when transitioning into any research environment. However, online institutions do not have a well-documented history of students transitioning into land-based institution or research intensive environments. Within this case study, the authors express ways to help meet the needs of the students and educate students in becoming better scientists who have been educated in online institutions by using methods from land-based institutions and implementing other forms of technology into the classroom. The authors explore instruction, knowledge, and experience, and suggest how online science instruction can be supplemented with

experience and technology that can increase their experience and knowledge to allow them to become better scientists.

ORGANIZATION BACKGROUND

Land-Based Institutions (LBIs) traditional teaching sessions are composed of one of 5 types: three 50 minute sessions that meet 3 times during the week; two 75 minute sessions that meet 2 times during the week; one 3 hour session that meet once a week; one 8 hour session that meet over the weekend, or complete independent study that is conducted between the instructor and the student. Within each of the types of course material instruction, each has the component of more human interaction and sharing of knowledge that allows time for students to: digest material that is presented to them, allow the student to incorporate the knowledge that comes from open discussion and interaction with a knowledgeable, experienced professional, time for students to make corrections within their understanding of the subject material within the courses, and a chance for the instructor to gauge students' abilities, knowledge, and experience from one-on-one interaction. In each of these sessions, the instructor would cover the subject material based on the syllabus, outline of the course objectives, and learning outcomes of the course. In order to achieve the goals of the course, the instructor has at his/her disposal all of the approved forms of information, teaching material, and technology that is available within the university. Additionally Instructors have the discretion to use the material in the course if they feel it will get the information, understanding, and concepts of the course material across to the student. In many instances when the course is not a lecture course, but it requires more hands-on experience, such as a laboratory course or a recitation, the instructor has more interaction with the student in the form of Teaching Assistants (TA) and face-to-face questioning of the student, and this provides a chance for Instructors to develop the students into better researchers.

In LBIs some science courses are normally taught with three components: a lecture component, a laboratory component, and a recitation component. Within these configurations it is possible for the instructor to present material within the lecture component that covers the background, theory, concepts and information of the material that is being presented. While the laboratory component covers the hands-on experience portion of the course, and the recitation component is used to reinforce information that is introduced in the lecture portion of the course and then correlated with information that is pertinent for the experiments within the laboratory. When courses are taught in this configuration, the student