Discovery Maps: A Student-Centered Approach to Reinforcing the Curriculum

Patricia A. Chase, Kari L. Franson and Ariane An
College of Pharmacy, Western University of Health Sciences, Pomona CA 91766-1889

This project was designed to improve the learning process for first and second year pharmacy students. Our goal was to help students remember key pieces of information in the curriculum, to help them see the relevance of all courses, and to assist them in understanding the components of an ability-based curriculum (knowledge, skills and attitudes). We designed a process where students develop Discovery Maps. Discovery Maps use a disease-focused approach. Students review all the courses completed in an academic year and map out the key pieces of information. The required knowledge, skills and attitudes are listed for each disease. The results of this research have been extremely positive. Students made significant process in reviewing key pieces of information for the entire academic year, and they were very positive in expressing a newfound understanding of the relevance each course. Student and faculty evaluations provided suggestions to improve the Discovery Map process and the entire curriculum. We feel the Discovery Map process is a unique method to involve students and faculty in improving the curriculum.

INTRODUCTION

Colleges continually seek methods to increase student retention of core knowledge, to improve the flow of information from the pharmaceutical sciences into the clinical portion of the curriculum, and to help students see the relevance of each course. It is an ongoing process, and one that educators struggle with constantly. In addition to providing students with the knowledge required to become a competent practitioner, CAPE outcomes stress the development of professional skills and attitudes. This project has been conducted for the last two years at Western University of Health Science, and seeks to overcome some of these challenges.

GOALS OF DISCOVERY MAPS

To Decrease Student Amnesia. In Pharmacy schools today, little time is available for students to review and reflect upon courses completed. Students see their role as passing a course, and moving on to the next. Consequently, in subsequent courses when students are called upon to recall previous information, they are unable to do so. Every faculty member has heard comments such as “I have never been exposed to that information before.” Lee Shulman from the American Association for Higher Education terms this disease “amnesia” or the situation that occurs when a student cannot recall information from previous courses. Pharmacy educators are forced to review core information in subsequent courses. This creates needless waste of time and use of valuable resources. Some educators have advocated the use of end-of-term, high stakes testing to ensure students retain key pieces of information across the curriculum. There is however, much debate over the value of these instruments. Our goal was to find a way to decrease the amnesia seen in pharmacy students.

To Eliminate Curricular Silos. Faculty in the pharmaceutical, administrative, and clinical sciences teach their coursework within their specific disciplines, with little cross-fertilization occurring in many programs. Students typically complete the pharmaceutical sciences at the beginning of the program, separately from the clinical and administrative sciences. It is the students’ responsibility to integrate the knowledge from different parts of the curriculum into meaningful application. Some colleges have tried team teaching all three areas simultaneously, in an attempt to improve integration of materials. Many of these efforts are extremely labor intensive for faculty members who find they are required to teach multiple times in several different courses. We felt there must be a way we could help to decrease the silo effect and to improve course integration, without asking faculty to make major changes in their instructional strategies or in course scheduling.

To Show the Relevance of All Coursework. In many of the health sciences, students do not see the need for the pharmaceutical sciences, which seem removed from the “real” care of patients. Students do not see initially see the importance of understanding gluconeogenesis for example, when they enter a health profession with the goal of caring for diabetic patients. Pharmacy students frequently complain about the significant amount of “useless” information that contributes to their apathy and amnesia. As faculty, we know that every course is important. Our goal with this project was to help students understand that every course is indeed important and contributes important information to becoming a competent practitioner.
To Advance Students’ Understanding of Ability-Based Education. Pharmacy students understand the importance of knowing facts. We develop our assessment instruments to ensure that students demonstrate they have the required knowledge. We believe however, that students must also understand the importance of acquiring the skills and attitudes to become excellent practitioners. Our goal in developing this project was to help our students look for, and develop the knowledge, skills and attitudes that an excellent practitioner must possess.

DISCOVERY MAPS
The Discovery Map project started from a basic flow chart that examined how different courses contribute to a student’s understanding of key disease states. The faculty at WesternU did this as we were developing the curriculum. We wanted to map the curriculum to ensure that disease states were covered in the appropriate depth and at the right point in the curriculum. An example of the flow chart is included in Figure 1. The flow chart represents an essential piece of information in understanding this innovation.

THE BLOCK SYSTEM OF ACADEMIC TIME
WesternU allocates academic time in a block system. In the block system, students take only one course at a time, for a period of 15-18 days. Students are required to be in class for six hours per day and there are approximately 108 contact hours in each block. Figure 2 shows a sample of the block curriculum for the first two years.

DESCRIPTION OF THE INNOVATION
At the start of the academic year, student teams are assigned disease states to map. All first and second year students are required to participate. Five students from the first year and five from the second year are assigned to each team; a total of twenty teams are assigned. No teams receive the same two diseases to map; two teams map each disease states. Because the project involves teams of first and second year students, teams are given class time to conduct team meetings. Students also consult outside references and with faculty who teach the specific courses. In this way, faculty provides ongoing input and assistance to the teams.

First year students review the courses taught in the first year of the curriculum (basic sciences, foundations, etc) while second year students primarily review courses in the second year (therapeutics, pharmacy administration etc.). Additionally, student teams review texts and references, contact patient support groups, and search Internet sites for information on their disease states. Students map the disease states by reviewing the curriculum and identifying the knowledge (pathophysiology, pharmacology, medicinal chemistry, etc.); skills (interpretation of data, developing a plan, communication, etc.); and attitudes (respect for patient, confidence, professionalism, etc.) that are taught in each course. Students share notes they develop over the course of the year, helping each other map assigned disease states. Disease states were selected for the project using morbidity and mortality data. We varied the disease states in the second year of the program to expand our list of Discovery Maps (see Figure 3). In the third year of the program we hope to continue to expand the list. Our goal is to map 40-50 disease states.

In researching the literature, we were unable to find anything that is similar to this project. There are descriptions of disease management maps, but Discovery Maps are different. Discovery Maps include all course materials and they map the students’ learning process. Discovery Maps include the management of patients (a disease management map), but also include the basic science curricular content (pharmaceutics, medicinal chemistry, pharmacology, etc.) plus foundations in pharmacy practice (calculations, physical assessment, history taking, etc.). Additionally, Discovery Maps identify the skills...
and attitudes required to manage a patient’s care. These additional areas are required of the practitioner to have an in depth understanding of the disease. A completed Discovery Map gives students a road map to follow to understand all aspects of a particular disease state. Other educators have described curriculum mapping, but Discovery Maps are different from curriculum maps that students generate the maps and faculty serve as reviewers. Curricular mapping is generally completed by faculty who want to ensure the appropriate coverage and sequencing of material in the curriculum. Because Discovery Maps are generated by students as they pass through the curriculum, the Maps have a tremendous effect on students’ understanding of the relevance of each course in the curriculum.

PRESENTATION AND GRADING

Teams develop written Discovery Maps for their disease states and present a poster presentation at the end of the academic year. The written Discovery Maps are placed on the WesternU file server so students can access all the maps. A typical Discovery Map is 20-30 pages and provides the students with an excellent review of each disease state. Faculty members assess the written Discovery Maps. On the last day of school, teams give poster presentations on the disease states. The poster presentations are assessed by P4 students who have completed the entire program and who are about to graduate. In this way, the P4 students also have an opportunity to review key disease states prior to taking the pharmacy boards.

ASSESSMENT

The assessment for this program includes student team and faculty review of the Discovery Map assignment. Additionally, because the teams have reviewed information provided by all the instructors over two years of the curriculum, plus used external resources (patient support groups, references, Internet sites) to develop the Discovery Maps, they are asked to critique the curriculum. We have received valuable input into ways we can improve the content and flow of the curriculum from these student evaluations. The instrument that was administered to students and faculty contained the same five questions.

Please comment on The Discovery Map Project.
1. Was it a valuable learning experience?
2. Was it a valuable review for the 20 disease states?
3. Do you feel the project aids student learning?
4. Did the project improve students’ understanding of the importance and sequence of blocks in the curriculum?
5. Did the project provide students with a learning framework that can be used to study other disease states?

SAMPLE STUDENT AND FACULTY COMMENTS

1. Was the Discovery Map Project a valuable learning experience?
   • The Discovery Map project is a good project.
   • The use of the Discovery Map to study for the boards was a good idea.
   • It was a good review, but it took too much time. Next year, I will be more efficient.
   • Yes, it certainly aided and prepared the P1s for the therapeutic portion of the curriculum and showed the
   • P2 students that they had to retain the basic science foundations.
   • Yes, the students found out that organizing information was valuable.
   • Yes, it has great potential, and should continue to be developed.

2. Was the Discovery Map Project a valuable review for the 20 disease states?
   • The disease states chosen were of great value to reinforcing pharmacy principles that may have not been clear when presented earlier. It was a good review for the 2nd years especially.
   • It was best for the P2s, because they have more knowledge.
   • Yes, but need to reassess the disease states and add other disease states as time goes by.
   • Yes, it also gave the students a way to review future diseases.

3. Did the project aid student learning?
   • I have to say yes!
   • Gives the pharmacy student a pattern for studying other disease states; especially for the boards.
   • Yes, good review of information.
   • Yes, I think the P2 class provided mentoring to the P1s.

4. Did the project improve your understanding of the importance and sequence of blocks in the curriculum?
   • It’s obvious that everything we learn in blocks is important.
   • Yes, I can see how each block was building a foundation in which each disease can be viewed in a piece-meal fashion, or how they can be seen as a whole.
   • I think the presentations are helpful. But I think we should improve them so students can better review the 20 disease states.
   • Yes, I hope to use the maps next year with my first year students in an integrated course. It has great potential.
   • Some teams did better than others in organizing and “discovering” where the information came from or how blocks might contribute.
   • By focusing students to review each block, they found information from all blocks. They were also able to integrate basic science and foundations blocks into the disease states.

5. Did the project provide the student with a learning framework that can be used to study other disease states?
   • Definitely, wasn’t that the intent?
   • Need to track this over time as students take other courses.

CONCLUSIONS

We learned as much about the interdependencies of courses in the curriculum as the students did. We not only encouraged, we required, students to review the coursework and to put it together in a meaningful way. We have now mapped over 30 disease states and continue to develop the program. Students understand the importance and interconnectedness of all courses in the curriculum. They also felt the review of previously covered material was extremely beneficial. Finally, they demonstrated a significant change in understanding of the knowledge, skills and attitudes required to manage the care of a patient.
This project provided an excellent overview of the curriculum. We gained invaluable feedback from the student evaluations. We learned specific areas of content redundancy, and topics that were covered inadequately. This was an excellent process to continue to improve the curriculum.

We have not only helped our students understand the disease states in greater depth, we have found we gave them a road map to explore any disease state. This is a wonderful map for lifelong learning. When faced with a new disease state, students will understand that they must visit each course and determine if there is critical information in that course to their understanding of the disease. All courses must be considered (e.g. biochemistry, molecular biology, pharmacology, therapeutics, pharmaceutics, pharmacoeconomics, etc.).

We were extremely excited by the feedback and comments from faculty members. They were impressed by the students’ understanding of the importance of their courses, and the fact that at the end of the year, students in the second year could remember key aspects of the basic science foundations in patient care. The faculty saw the silo effect reduced and were excited that students contacted them with questions about their course materials. Our faculty has become extremely interested in using the maps from the beginning of the curriculum with each course focusing part of their instruction on developing the maps. The project, as the name implies, has been a “discovery process” for both the faculty and students at WesternU. We feel this project could be easily implemented in any college or school of pharmacy.