

Poster sessions as a learning tool in teaching immunochemical techniques

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Abstract

The role of poster sessions as teaching and learning tools is increasing and this article describes the experiences in the development of poster sessions, as a learning tool, in the learning and teaching of the principles and applications of immunochemical techniques to Pharmacy students. Posters illustrate up to date information on techniques, chosen by the students, starting from a systematic search of specialised literature. The article discusses advantages of poster sessions as teaching and learning resource, including acquiring abilities for making and presenting a poster (and hence the messages) to a scientific audience, gaining incentives for researching a topic in depth, and promoting scientific topics (eg. immunology) in the department. This approach is a valuable learning tool, not only due to the comprehensive introduction to scientific (immunochemical) techniques, but also because it helps the students to prepare for their future career plans. In course evaluations, the students cited a high degree of satisfaction with poster presentations.

Keywords: *immunochemical techniques, Immunology, Pharmacy students, poster sessions, teaching, and learning.*

Introduction

As one result of the expansion in modern medicine and molecular biology, pharmaceutical sciences have become more closely related to other basic biomedical sciences, such as cell biology, biochemistry, genetics, physiology and immunology. An increasingly important role is being played by immunology in clinical studies and in the research-development of new biotechnological products for the immunotherapy of several diseases.

Therefore, the improvement of the undergraduate curriculum in the career of Pharmaceutical Sciences in Cuba led to the introduction (in the academic year 2000-2001) of an Immunology course in the discipline of Microbiology and Pharmaceutical Biotechnology for third year students. The interpretation of the results of immunochemical techniques in the detection of the antigen-antibody reaction, as well as in the quality assurance of biologicals is one of the main abilities to be developed by the students during this Immunology course.

This goal is partially accomplished by means of practical classes carried out in biological research centres and in hospital institutions. These activities provide the students with a window into potential career opportunities in the field of Immunology. On the other hand, previously we assigned to students a paper covering a particular technique or immunoassay and its application. Students researched the material and were expected to write a coherent essay on the topic. However, it emerged that the other students in the same class learned little about other topics except their own. This approach promoted passive learning and superficial memorisation.

One alternative to this activity is to hold a poster session, an idea we got from Thomas Volk who suggested students to make posters in mycology courses (Mycology, Medical Mycology and Plant-Microbe Interactions) (Volk, 2001). We also considered a visionary article about the use of the 'poster' and other forms of scientific communication published in *Biochemical Education* (Saffran, 1987), and the experiences of Miriam Lee during our studies at the University of Havana in holding competitive poster sessions with the results of the students scientific projects.

The popularity of poster sessions for the presentation of papers at meetings is well known and recommendations on their preparation and use have been published (Seventh Biennial State of the San Francisco Estuary Conference, 2005). Moreover, their role as teaching and learning tools is gaining more advocacy. The increasing use of computers and better printers to design and print posters favours its diffusion. In the field of Biochemistry, for instance, a poster presentation was introduced by Caspers and Roberts-Kirchhoff (2003) as a requirement for a test-control project in an undergraduate Biochemistry laboratory course with emphasis on a research experience. Fernandes et al. (2005) also described the poster display as an alternative evaluation method in basic biochemistry.

Taking into account these antecedents, we intended to hold a poster session in our Immunology course focused on the application of immunochemical techniques in the biomedical research. This approach has been used for the past five years.

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Materials and methods

Running the poster session

The poster assignment is made in the second week of the semester by the professor. For this project, student teams of 3-4 persons were required. Students received a sheet with detailed instructions about the presentations: choice of topics, time for preparing the posters (five weeks), date and place of presentation and the general guidelines to keep in mind when making a poster. The use of the imagination is highly encouraged. The posters will be planned, conducted and presented orally by the group members.

Students are incited to search the scientific literature on Immunology and to select a topic related to the use of one (or more) immunochemical techniques to detect the antigen-antibody reaction applied to illness diagnosis, quality assurance of biological, drugs or anything else. The topics must be communicated to the faculty staff in advance to avoid duplicated topics. Although the instructor did not determine topics for posters, faculty can lead some students towards basic topics that will be useful for future classes.

Table I. Self and group evaluation form

Directions: This form must be filled out completely and correctly. For each item, assign a score of 10 to 2. (10= strongly agree, 8= agree, 6= somewhat agree, 4= disagree, 2= strongly disagree).

Add up the score for all items to calculate a total score. Do this for yourself and each other team.

Group name: _____	Score
<i>Organization</i>	
- Structure of the poster (it should contain the recommended parts: title, authors, abstract, methods, data, figures, references).	_____
- Logical order of the sheets that facilitates their reading.	_____
<i>Formal aspects</i>	
- Neat looking, legibility.	_____
- Aesthetics and initiatives developed.	_____
<i>Content</i>	
- Quality of the summary.	_____
- Accuracy of the information.	_____
- Depth in the analysis of the topic.	_____
- Relevancy of the figures and charts and their usefulness for understanding the information.	_____
<i>Understanding of the topic</i>	
- Oral presentation.	_____
- Answers to the formulated questions.	_____
<i>Total</i>	_____

Results and discussion

Increased focus on the achievement of outcomes related to communication, interpersonal interactions, critical thinking, and life-long learning demands that innovative instructional tools be developed and implemented (Nowak, 1998).

The design of poster sessions into an introductory Immunology course, particularly for teaching immunochemical techniques provided many lessons about the usefulness of this approach as a learning tool. All the students' teams successfully conducted the research on the selected topic and finally, were able to present the information as a poster. Examples of the chosen topics are listed in Table II.

Poster presentation was characterised by the synthesis of

Posters development and assessment

On the day fixed for the development of the session, the different teams carry out the design and assembly of the posters. At the appropriate time, students expose the content of their posters to the participants and time is allotted for questions. Questions on the economic aspects, as the assay time, reagents availability and the equipment needed are additionally encouraged.

Each team was asked to complete a self-assessment using a faculty-designed evaluation form (Table I). This form was completed at the end of the activity and it was also used to give points for the rest of the teams.

The final evaluation of each poster is determined by the average score of scoring from the other teams. The Instructor's role is limited to act as facilitator or guide of the activity. The expectation is that the instructor will provide little or no interference in the process.

information; therefore, discussion and reflections were key components of the activity. The quality of the final products submitted appeared to be driven by the motivation of the individual group members, and team-work was an obvious indicator of a quality end product.

The overall mean rating of posters in the course 2008/2009 (as an example) was 90.0 on a 100-point scale based on the faculty-designed evaluation form. The main aspects in which students lose points include the use of a too small font, or not putting the data of the authors or aspects related with the aesthetics. In addition, some students lose points for items related to the in-depth treatment of the topic, for instance, not pointing out the advantages of the chosen method or in the answers to the formulated questions during the oral presentation (Table III).

Table II. Examples of topics selected by the students for poster sessions

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- Validation of enzyme immunoassays for antibiotics determination (i.e. aminoglycosides).
 - Immunoassays in pharmacokinetic studies.
 - Enzymatic immunoassay on solid phase (ELISA) for detecting antibodies anti-phenolic I glycolipid of *Mycobacterium leprae* and the semi-synthetic analog in leprosy patients.
 - Immunotitration of IgM antibodies in clinically suspected measles samples.
 - Use of an ELISA inhibition method for dengue serological diagnosis.
 - Comparison of an ELISA with the techniques of indirect immunofluorescence and complement fixation for the diagnosis of toxoplasmosis.
 - Serological study of patients with leptospirosis by means of the TR antigen.
 - Use of the microhaemagglutination technique for antibodies anti-*Treponema pallidum*.
 - Neutrophil anticytoplasmic antibodies in patients with diabetic nephropathy.
 - Diagnostic sera for the identification of *Pseudomonas aeruginosa*.
 - Indirect ELISA for the detection of antibodies anti-polysaccharide C of *Neisseria meningitidis*.
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ELISA: Enzyme linked immunosorbent assay

Table III. Overall mean rating of posters (n= 18), course 2008/2009

	Score
<i>Organization</i>	
- Structure of the poster (it should contain the recommended parts: title, authors, abstract, methods, data, figures, references).	<u>7.8</u>
- Logical order of the sheets that facilitates their reading.	<u>8.2</u>
<i>Formal aspects</i>	
- Neat looking, legibility.	<u>8.7</u>
- Aesthetics and initiatives developed	<u>8.4</u>
<i>Content</i>	
- Quality of the summary.	<u>9.5</u>
- Accuracy of the information.	<u>9.6</u>
- Depth in the analysis of the topic.	<u>9.9</u>
- Relevancy of the figures and charts and their usefulness for understanding the information.	<u>8.4</u>
<i>Understanding of the topic</i>	
- Oral presentation.	<u>9.8</u>
- Answers to the formulated questions.	<u>9.7</u>
<i>Total</i>	<u>90 / 100</u>
<i>Comments</i>	

Obtaining feedback about students' attitudes toward this or any educational approach is an important step in adopting new methods of teaching. The integration of poster sessions into the course setting appears to be a practical approach to assisting students to learn skills and technical knowledge.

Students reported enjoying the poster sessions. They demonstrated interest and appeared engaged in the process. Students' written comments indicated that they benefited from the way immunochemical techniques was covered and enjoyed the classroom environment (Table IV). Students had the possibility to display their creative initiatives in a different way to the traditional methods, which promote passive learning and superficial memorization. Moreover,

students gained experience in making a poster and in the presentation to an audience. This fact impacts positively their personal formation for future scientific meetings in later professional life. In view of the quality of presented posters, many have been selected to attend the Scientific Forum of Pharmacy Students at the University of Oriente.

In summary, the students learned much from each other about searching for information and demonstrated an ability to think and answer questions, using contextualised knowledge. The common suggestion for improvement of the activity was that the students would like clearer instructions on the expectations of the assignments.

Table IV. Student comments about poster sessions

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- "I learned how to better explain my ideas, in a way that they were understood".
 - "I learned how to make nice graphs and tables on the computer during poster developing".
 - "We shared the joys of Power Point, and we each made some slides for our presentation".
 - "I learned how to divide responsibilities. We put our immunological knowledge together better when we worked together".
 - "I liked that you were trying new things with us. It was nice to have a change from every other class".
 - "It was nice to learn concepts and then actually apply them to practical and research situations instead of memorize facts".
 - "I enjoyed working with my group".
 - "The class material was covered in a good way".
 - "Provide more guidance/ structure to the group".
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The instructors made the following observations. Group activities were beneficial to students learning Immunology principles and provided opportunities for a deeper understanding of immunochemical techniques. Thus, the poster session is an effective method to involve the students in critically researching a topic and therefore in the interpretation and inference-making of published data. Students can also make links between a particular subject and the general immunological knowledge received in formal classes. Posters are available for use in the course and in other courses in following semesters, and additionally, Immunology is promoted in the department.

Group interactions during poster sessions created a more interesting and exciting classroom environment. Students increased their competence in teamwork, in critical thinking and in communication. The students were also able to think

and talk about learning strategies that worked for them. The proposal demonstrated the didactic value of poster sessions for active learning and its contribution to the assimilation of new knowledge in the future.

Poster sessions serve to allow students to explore areas of interest and construct much of their own learning. The potential gain from using poster sessions in pharmacy education is a possibility worth exploring. This approach as a teaching and learning method in the area of pharmaceutical sciences warrants further exploration in terms of curriculum development and pedagogical research.

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