# From paste-up to power-up: Supporting students to design a research poster

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This paper describes the evaluation of a single teaching intervention, a poster design seminar, facilitated by a professional designer, for a 2nd year undergraduate ecology class. We provide some evidence that the intervention enhances students' understanding and practice of visualisation skills. We also recommend the use of readily available and accessible tools (such as PowerPoint) to reduce the amount of time needed for technical support. Our experience leads us to suggest that including the teaching of visualisation skills in the undergraduate science curriculum may be a simple strategy to help future scientists to become more effective and independent visual communicators.

Keywords: research poster, design, visualisation, communication, Powerpoint

## Background and rationale

Scientific knowledge cannot advance unless it is effectively communicated both within and beyond the scientific community. Scientific research posters, which first appeared in scientific conferences during the 1970's, were quick to be accepted as an alternative to the more traditional paper (Gosling, 1999). Communicating effectively through research posters depends not only on content but also on visualisation, or the ability to convey key messages through visual presentation. As Welch & Waehler (1996) reporting on a study of 271 attendees at the 1993 APA Convention poster sessions argue: "attendees' opinions of posters are influenced as much by visual presentation as by content". Therefore, acquiring the skill of visualisation seems to be vital to the success of communicating research.

A Google Images search for-"research posters" demonstrated to the authors a wide gap in visualisation skills between professionally and non-professionally designed posters. Lack of visualisation basics is evident in many non-professionally designed posters; lack of creativity, colour contrast and poor use of space are some of the more common pitfalls, jeopardizing the posters' ability to communicate the ideas behind them. Are scientists then obliged to hire a professional designer for each poster they would like to present or else be doomed to fail to communicate effectively via the poster?

We suggest that a sustainable approach to this problem is the involvement of a designer at an earlier stage: teaching basic visualisation skills to undergraduate science classes as a part of the curriculum. There is some support for this notion in the literature. Rushmeier, Dykes, Dill, and Yoon, (2000) claim that visualisation skills are required by a broad range of students while Domik (2008) makes the case that visualisation is, by nature, multidisciplinary.

This paper describes the evaluation of a single teaching intervention, a poster design seminar facilitated by a professional designer, for a 2nd year ecology class. Five weeks of the class are devoted to a research project, which aims to help students become critical thinkers and to develop the necessary skills to become researchers in their field. As part of this students are required to work in groups to produce a research poster. Research poster production has been part of this course for a number of

years but this is the first time students have been required to produce digitally printed rather than hand-made posters.

In order to be able to use visualisation skills in a digital environment, students must be familiar with and have access to suitable software (Waycott et al., 2010). Graphics software is widely available and according to a 2008 Educause Center for Applied research (ECAR) report 73% of students already use it, however an even larger proportion of students (91%) use PowerPoint (Borreson Caruso & Salaway, 2008). PowerPoint is well known as a presentation tool, but is less known for its poster production capabilities. In order to focus on the elements of visualisation during the design seminar rather than supporting students to acquire graphics software skills, our idea was to follow Marek, Christopher and Koenig (2002) and promote the use of Powerpoint as a potential poster design tool thus obviating the need to learn new software.

Two key questions are explored in this paper:

1. Did the design seminar presented by a design professional enhance the students' ability to communicate their research through research posters?
2. Does placing the emphasis on teaching visualisation skills rather than technical skills disadvantage students who are required to produce research posters?

## Method

Seventy-five 2nd year ecology students working in groups of around five were required to produce one research poster per group describing the relationships of an ecological system of their choice. The students had one week to collect the data for the poster and one week to design the poster. After completion of the research poster assignment at the end of the second week a 30 minute poster session, similar to a mini conference, was held. Each student was required to write a brief peer review of the poster that he or she felt was most successful in terms of its content and design, but these reviews did not count towards final assessment. The final assessment of the poster assignment was done by two reviewers (a laboratory demonstrator and a lecturer) and counted 10% towards each student's final grade.

In previous years the class was given a 15-minute talk by one of the lecturers to provide an overview of the elements of successful communication in a research poster. As a result of the decision to require students to produce the posters in digital form a designer, and first author of this paper, was consulted. The result of this consultation was that a new 40-minute seminar on poster design, facilitated by the designer, was included in the course. Other than legibility and attracting attention, there was no overlap in content between the guidelines from previous years and the design seminar. The seminar was held during the second week, at which point the students began working on communicating their research findings. Both the elements of visualisation (30 minutes) and technical details, such as setting up Powerpoint for poster production (10 minutes) were included in the seminar.

The visualisation part of the seminar aimed to:

1. Help students to analyse examples of research posters from the international scene through the provision of a design framework.
2. Stress the importance of visualisation and its impact on communication through critiquing poster examples and analysing students' first impressions of the example posters.
3. Provide basic strategies (attention, design grid, colour contrast, space and font) to enhance communication through discussing the methods that were used or could have been used in the poster examples.
4. Empower and inspire students to "think outside the square" and communicate their research in creative ways through presenting tips and examples of good practice.

The technical part of the seminar aimed to enable students to produce their posters using readily available digital tools. (Powerpoint was featured as a viable option given the one-week timeframe to produce the posters. If students were already familiar with other graphics packages – for example, Photoshop, Illustrator, they could use these instead.)

A summary handout was provided and students were asked to fill out an evaluation questionnaire immediately following the seminar on poster design. The questionnaire was designed to explore the value of the seminar to students, elicit what they learned from it, determine whether material covered was new, and finally gauge student beliefs about whether the seminar was likely to assist them in designing their own research posters.

At the conclusion of the course, the designer analysed the posters produced and the student peer-reviews according to five taught criteria: attracting attention through creativity, use of design grid (organized structure), use of space to avoid overload and to emphasize main points, and use of colour contrast and fonts to increase legibility.

The designer was not involved at all in summative assessment for the course itself.

## Results

Of the class of 75 students, 51 completed the post-seminar evaluation questionnaire. In answer to the general question relating to the value of the seminar the responses were largely equivocal. However, in response to the more specific question of whether the seminar was likely to be helpful to them in terms of designing their own poster 82% of the respondents indicated that it was. The ability to use Powerpoint to produce posters was also identified as a useful or a new idea by several respondents but this was not the dominant theme. The main theme identified by 34% of the respondents as the best feature of the seminar was the opportunity to analyse research posters. Conversely the main theme identified as the worst feature was the length of the seminar (49%).

Most students used PowerPoint for the production of the posters and neither teaching staff nor departmental technical support staff received any requests for technical support for poster production. All students also successfully met the deadline for submission of the poster, which was five days following the seminar. Fourteen student research posters produced following the seminar were collected and analysed by the designer. We felt it may be useful to compare the current year's posters with published posters from academics in the same discipline to provide some comparison (Figure 1).
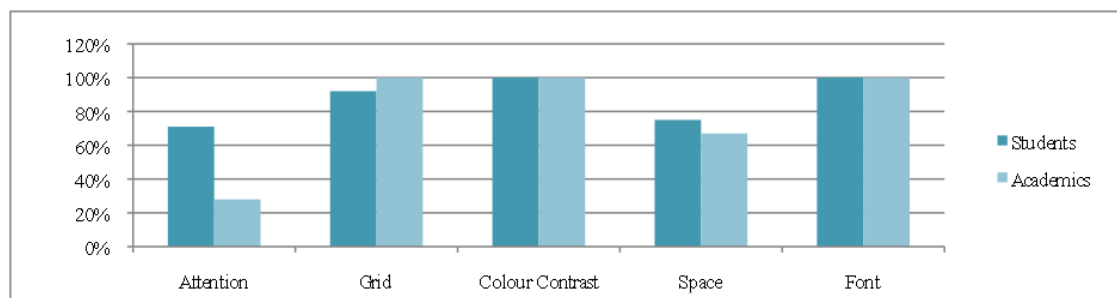


**Figure 1 - Analysis of design criteria in students' vs. academics' posters (14 posters each)**

In order to discover whether attending the design seminar might have affected students' critical review of posters, peer reviews of the posters from both 2009 (71) and 2010 (65) were examined. (Figure 2).
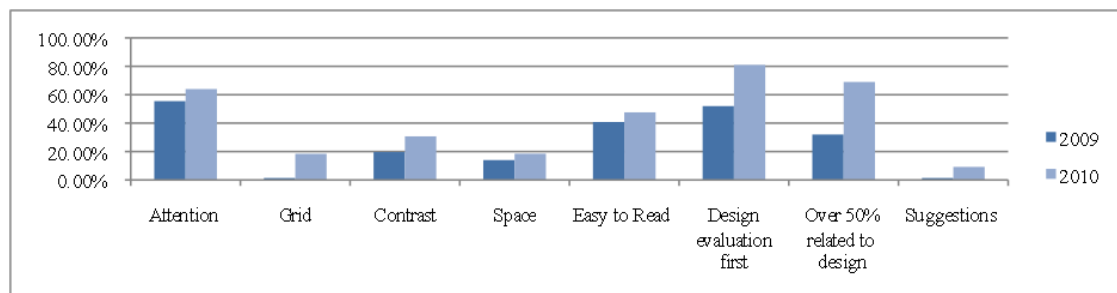


**Figure 2 – Analysis of design elements in peer reviews of posters from 2009 and 2010**

There is a clear increase in the percentage of the 2010 reviews that mentioned legibility and the ability to attract attention, as well as addressing colour contrast and space. The number of reviews which focused on the design of the poster, as opposed to the content, also increased (32% in 2009, 69% in 2010). Consideration of the poster design came before consideration of content in 81% of the 2010 reviews whereas in the previous year only 52% of reviews considered the poster design before the content. An increase is evident also in the number of suggestions for design improvements (1.4% in 2009, 9.2% in 2010).

## Discussion and conclusion

We set out to explore two key questions and we now examine each of these in turn.

*Did the design seminar presented by a design professional enhance the students' ability to communicate their research through research posters?*
Student evaluations collected immediately following the design seminar provided a strong indication that students felt that the seminar was likely to help them in designing their own posters.

Analysis of the poster by the designer showed that there was good evidence of creativity and good use of space to feature key messages in the student posters. A key challenge in teaching visualisation is the use of space (Hanrahan, 2005) and in the experience of the authors, encouraging creativity is another. These were also among the key features emphasised in the seminar.

Analysis of the peer reviews and comparison with previous year's reviews clearly demonstrated an increase in students' ability to explicate all the design elements of attracting attention, legibility, space, colour contrast, and the use of the grid. Another interesting feature was that consideration of the poster design was often dealt with before consideration of the content and students were also more willing in their reviews to offer suggestions for improvement.

Overall therefore, we do have some evidence to support the idea that the design seminar enhanced the students' understanding of visualisation beyond the previous guidelines provided to students. Whether an understanding of visualisation techniques enhanced their ability to communicate their research through research posters is probably still an open question, and was not directly addressed in this study. Nonetheless, as we have noted there is support in the literature for a link between visualisation skills and effective communication.

*Does placing the emphasis on visualisation skills rather than technical skills disadvantage students in the production of posters?*
Most students did use Powerpoint to produce their posters rather than more specialised graphic design software. There was not a single report of technical issues in relation to poster production and all students not only completed their posters but also completed them on time. This combined with evidence of students demonstrating visualisation skills and an understanding of the elements of visualisation, from analysis of the student posters and the peer reviews, suggests that students were not disadvantaged by placing the emphasis on teaching visualisation skills. On the contrary, we believe they were advantaged through greater exposure to visualisation skills.

Finally, we hope that this paper will, in some small way, inspire others to consider involving a designer in teaching basic visualisation skills as part of the undergraduate science curriculum. This simple intervention at an early stage may help future scientists become more effective and independent visual communicators and thereby support the advancement of scientific knowledge.

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