A scientific poster is not a scientific article!

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Kent D. Kobayashi
Tropical Plant & Soil Sciences Department
University of Hawaii at Manoa
3190 Maile Way, St. John 102
Honolulu, HI 96822 USA
E-mail: kentko@hawaii.edu

Kauahi Perez
Tropical Plant & Soil Sciences Department
University of Hawaii at Manoa
3190 Maile Way, St. John 102
Honolulu, HI 96822 USA
E-mail: bronsonp@hawaii.edu

Abstract

Over the years, poster presentations at scientific conferences have achieved the status of oral presentations. A conference may have hundreds or thousands of posters displayed in various sessions. However, after having gone to scientific conferences for 34 years, we realize there is still a misconception that a poster is simply a large piece of paper with a scientific article on it. It is not! A poster is an entirely different mode of disseminating scientific information. Its obvious goal is to present research findings. Yet, visualize a poster as an advertisement, which strives to catch the eye of the viewer. It must have eye appeal. It needs to be well designed and attractive because a poster must first grab the attention of passersby within two seconds. It needs to hold their attention for a few more seconds while they browse through the poster to determine if they even want to read it. Finally, the poster holds the viewers' attention for a few minutes while they look at it in more detail and start talking to the presenter. During a poster session, presenters typically stand by their posters for only a short period compared to the length of the conference. Thus, people view a poster when the presenter is not there so it needs to entice viewers on its own merit. How can a poster do this? A poster's appeal is through visuals and graphics (photographs, illustrations, graphs, and figures). Text is of secondary importance. Putting what looks like a scientific article (with its small font size, lots of text, small figures and tables) will put off viewers. In conclusion, designing a poster to achieve its goal, in addition to its content, requires thorough planning and analysis about audience psychology, human nature, and visual perception.

Additional index words. scientific conferences, scientific meetings, visual perception, audience psychology

Introduction

Poster presentations at scientific conferences have achieved equal status as oral presentations. For the same reason, careful planning and designing of posters are needed to ensure that they achieve their goal. The goal of a scientific poster is to present research findings clearly and concisely. However, after observing posters at many scientific conferences over the years, we realize there still remains a misconception of the purpose of a poster.

Campbell (2004) stated that a poster is a mini-manuscript. But, a poster is not a scientific manuscript (Mitrany, 2005). The problem with too many posters is that they look as if the authors merely cut and pasted a scientific article onto the poster paper. Too much information is presented (Hamilton, 2008). Excessive text results in the font size being too small. Too many small graphics are crowded onto the poster. Beamish et al. (2014) found that 24-28% of posters were characterized as difficult to read. Because a poster is a reflection upon the presenter and their department and university, poster quality is as important as the message being conveyed (Ellerbee, 2006).

Compared to a scientific article, a scientific poster is an entirely different means of disseminating scientific information. Visualize a poster as an advertisement, which strives to catch the eye of the viewer. It must have eye appeal! It needs to be attractive and well designed because a poster must first quickly grab the attention of passersby. You have about three seconds to catch the audience's attention (Van Dalen et al., 2002). Driskill (2010) reported that most engineers decide in less than five seconds whether to stop and read a poster. The poster must hold the viewers' attention while they skim the poster to determine if they want to read it. And finally, the poster has to sustain the viewers' attention while they look at it in more detail and start talking to the presenter.

During a poster session, presenters typically stand by their posters for only a short period compared to the length of the entire conference (Campbell, 2004). For example, at an American Society for Horticultural Science (ASHS) conference, presenters stand by their poster for only 45 minutes during the four-day conference. People will view a poster when the presenter is not there, emphasizing that the poster must be self-explanatory with little guidance needed on the part of the presenter (Day and Gastel, 2011). It should attract and inform viewers on its own merit. A poster's appeal is through visuals and graphics (photographs, illustrations, graphs, and tables) with text being of secondary importance. Putting what looks like a scientific article (with its small font size, lots of text, and small figures and tables) on a poster will discourage viewers from giving such a poster a second glance. Driskill (2010) indicated that a text-heavy design puts off readers. When faced with many posters, it is natural for people to be drawn to the most eye-catching posters (Larive and Bulska, 2006). Bell et al. (2006) pointed out that conference participants want to see the posters easily and clearly. Hence, the objective of this presentation is to analyze the features of a good scientific poster and why it is not a scientific article.

A Scientific Poster vs. a Scientific Article

A scientific poster is one of the two main formats used to present a paper at a scientific conference (**Figure 1**). The other is a scientific talk. The purpose of the poster is to present clearly and understandably the results of a scientific study in a format of graphics and text. We are all familiar with science fair posters that we have seen and done in grade school through high school. A scientific poster is more elaborate and detailed (**Figure 2**). Paper posters are a certain size specified by the organizing society of the scientific conference. Posters at ASHS conferences are limited to 47 inches x 47 inches. At the Hawaii International Conference on Education, posters need to fit on a 48 inches x 36 inches tri-fold display board.

The scientific poster is a preview of, hopefully, a scientific article to come. It presents the latest research results before the results appear in a scientific article. A poster provides only highlights of a study and does not present the study in considerable detail such as in a scientific article. Information is primarily graphical with the presenter being there to provide additional information and discussion. The scientific article stands alone with no authors present. Therefore, if further information is needed, the reader has to contact the authors.

A poster session lasts for a specific amount of time, for instance, 45 minutes at ASHS conferences or 90 minutes at the Hawaii International Conference on Education. A presenter stands by their poster and discusses it with interested conference attendees. Typically, posters are set up in a large room such as a ballroom at a hotel or a convention center (Campbell, 2004). A poster is meant to be viewed quickly (for just a few minutes) before the viewer moves on to the next poster. It is viewed when the presenter is there or absent. As a consequence, posters must be able stand alone without having a presenter there to explain it (Larive and Bulska, 2006).

Posters must be eye-catching and striking (**Figure 3**). Its components need to be large enough to be read at a distance, especially when the viewer is part of a group. Information is presented in an easily read format, that is, with lots of graphics and few words (Day and Gastel, 2011). Ellerbee (2006) emphasized that by achieving a balance between visual and textual elements, you can draw people to your poster. In a ballroom, there may be several hundred to over a thousand posters on view. As a result, a poster must compete with the other posters in drawing the attention of the conference attendees.

In contrast, a scientific article is read at leisure by the reader. This difference in time is critical and enables an article to have much more details, text, and graphics. Both the text and graphics can be small. There is no time constraint in reading an article as there is in viewing a poster. The reader has time to read the text thoroughly and study the tables and graphs in detail.

Understanding the Audience at Conferences

The audiences are different for a scientific poster and a scientific article. The article is generally read by people who are doing the same or similar research as the authors. The poster is displayed not only for viewers who are doing similar research, but also for the general audience attending the conference. This includes people who are not familiar with the research being presented in

the poster. Accordingly, authors need to tailor their poster for these viewers, too (**Figure 4**). After all, people who are doing similar research as the authors will view a poster whether it is good or poor.

One way to "measure" the impact of a poster is to divide the cost of attending the conference (conference registration, airfare, hotel, airport shuttle, per diem, and parking) by the number of people who look at the poster and talk to the presenter. This can serve as a rough indication of the interest, appeal, and impact of the poster. We are striving to get the most "bang for the buck" because attending a conference can be costly, often $2,000-$2,500 or more. Since the poster may be displayed while the presenter is not standing by it, a manila folder with color laser copies of the poster can be posted on the poster display board (**Figure 3**) (Campbell, 2004). By counting how many of these color laser copies are taken by conference participants, one can get an estimate of the interest and impact of the poster.

Visual Appeal

The weaknesses of a scientific article type poster include too much information and too much text. Mitrany (2005) found that the most common mistake of authors of poor posters is trying to communicate too much. To put all this text on the poster results in the font being too small to be read at a distance. Too much text also means the viewer has difficulty skimming the poster in just a few minutes before moving on. Driskill (2010) reported that an analysis of 154 posters presented at an American Institute of Chemical Engineers Annual Meeting found that only 20% of the posters had an optimal design. A common problem was poor legibility resulting from too much text, small font sizes, and poor use of color. Too much text is psychologically a turn off to the viewers.

Visuals such as graphs, tables, illustrations, and photographs are typically too small. They are difficult to see at a distance. In addition, too much information is presented in these visuals. Remember, the graphics of a poster need to be simple because they are skimmed and not studied in detail as with a scientific article.

Design Considerations of Scientific Posters

Above all, scientific posters are meant to be skimmed, not read in detail. Van Dalen et al. (2002) emphasized that a poster should be understood at a glance. As such, information must be presented in a way that enhances this. A poster has to compete with many other posters at the same time. The test of a good poster is whether the material can be absorbed within two minutes (Whimster, 1989).

Besides obviously having good content, a poster must be appealing and attention-grabbing. It is like the stores in a shopping center. They are all competing for the shoppers' attention as they walk by. Hardicre et al. (2007) explained that posters are a visual display and should entice the audience to move in closer, rather like a window display. Similarly, a poster is competing for the viewers' attention as they walk by. The overall impression of the poster needs to hold the

viewer's attention long enough for the viewer to decide to read the poster. The best posters help viewers decide quickly whether to stay and read the poster (Driskill, 2010).

Various styles, layouts, and graphics have made their way onto the scenes of scientific conferences. There is some room for artistic creativity when creating posters. Authors should employ their artistic talents, which give their posters a unique identity, in order for their posters to be noticed. Additionally, the use of color combinations can attract or deter viewers from viewing it. Using high contrast color combinations can attract the attention of passersby from near and far (**Figure 5**).

Lots of graphics and less text contribute to viewers deciding to read a poster. Use graphs instead of tables, if possible (Whimster, 1989). Use big graphics and fonts. The idea is to make the viewer's job easier (Mitrany, 2005). This helps to attract and hold the attention of the viewer. It helps foster understanding of the poster's content by the viewer. The organization and layout should help the viewer glance at, skim, and get the main points of the poster easily and quickly. Good navigation is critical so as not to disorient and confuse the viewer (**Figure 6**). The poster should clearly indicate the path that the viewer's eyes should follow (Driskill, 2010). The information you use and the style in which you use it in a poster can make or break a message (Briggs, 2009).

Posters are looked at left to right and top to bottom. The authors need to construct the poster to help the eye flow of the viewers and enhance easy navigation through the poster (**Figure 4**) (Van Dalen et al., 2002). If the organization and layout are poor, it will be difficult for the viewer to navigate through the poster (**Figure 6**). There should be an obvious sequence to follow (Whimster, 1989).

Posters should have the title, authors, affiliations, introduction, materials and methods, results, conclusions, and acknowledgements sections (**Figure 2**). Beamish et al. (2014) reported that 81-93% of posters were formatted using aims, methods, results, and conclusions sections. The discussion section can be omitted since the presenter will handle this. Hamilton (2008) suggested omitting the abstract, discussion, and reference sections, with which we agree. Additional information can be omitted from the poster and included in handouts that are attached to the poster board or linked through QR (quick response) codes on the poster (**Figure 3**) (Whimster, 1989). Beamish et al. (2014) found that 19-82% of posters included references on the posters. We feel references should be left off the poster and included in a handout. Also, do not include the abstract on the poster (Miltrany, 2005). Abstracts can be handled with a handout if the abstracts are not already included in the technical program (printed, flash drive, or online). Space on a poster is too valuable to be taken up by items best handled with handouts.

Conclusions

In conclusion, designing a scientific poster to achieve its goal requires precise planning and the analysis of audience psychology and visual perception to ensure it is not a scientific article. Putting a poster together is both a science and an art, much like creating a scientific article.

However, the difference in creating a poster lies in visual appearance, cleanliness, readability, and its appeal to many passersby. Simply put, a scientific poster is not a scientific article!

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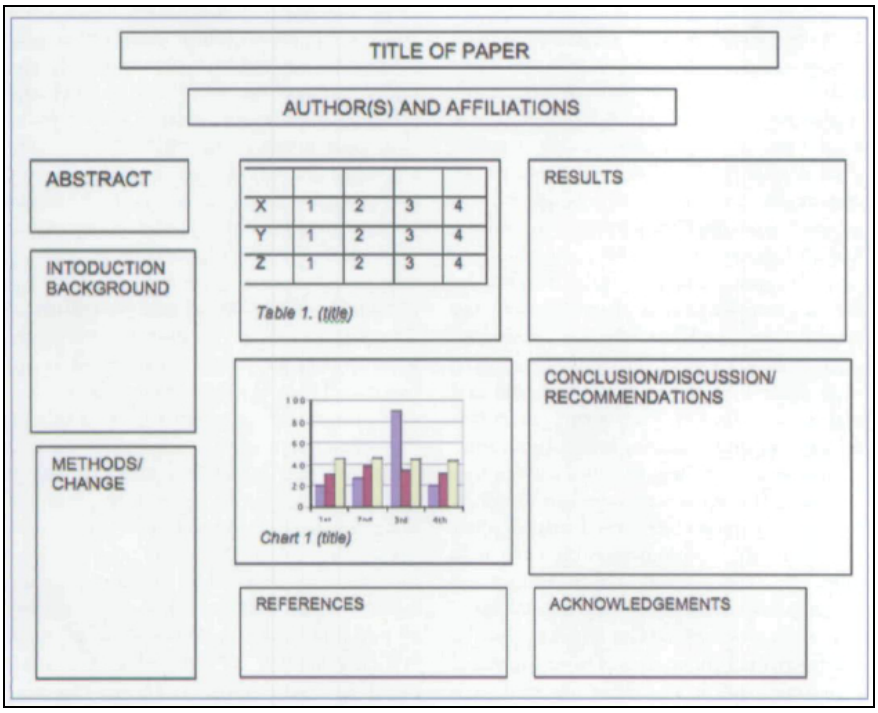

Figure 1. Example of the organization and layout of a good scientific poster. From: Hardicre et al., 2007. Discussion and References sections may be omitted.

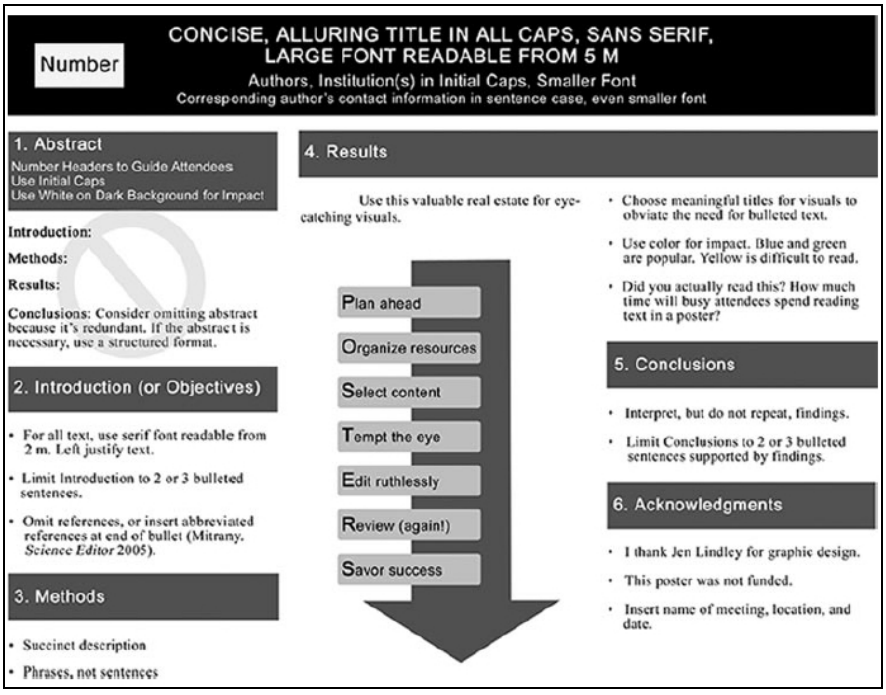

Figure 2. Detailed organization and layout of a good scientific poster. From: Hamilton, 2008. Abstract may be omitted.

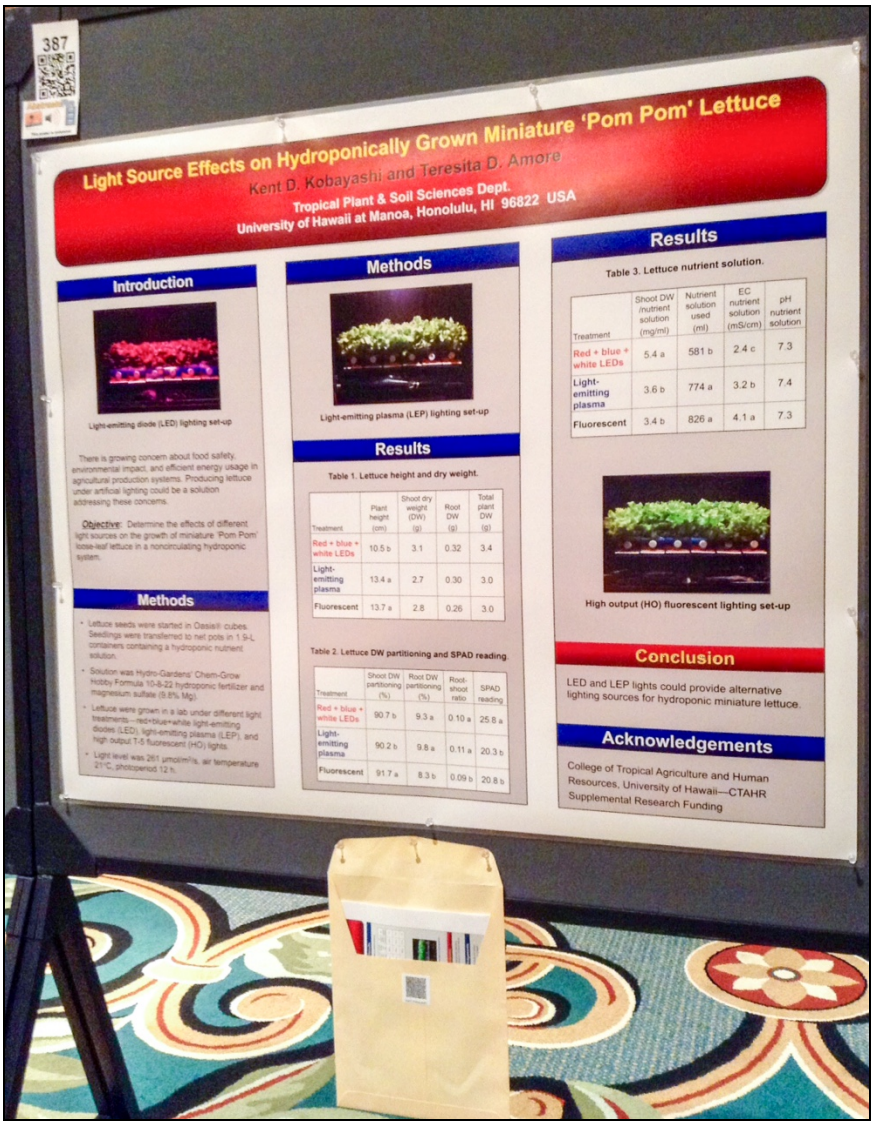

Figure 3. Our poster displayed at the 2014 Annual Conference of the American Society for Horticultural Science in Orlando, FL. Poster is 42 inches wide by 36 inches tall. Manila envelope held color laser copies of the poster. The QR (quick response) code in the upper left linked to the poster abstract.

Figure 4. Our poster for the 2013 Hawaii International Conference on Education in Honolulu, HI. Poster is 42 inches wide by 36 inches tall. Numbered headings aid the viewer's eye flow.

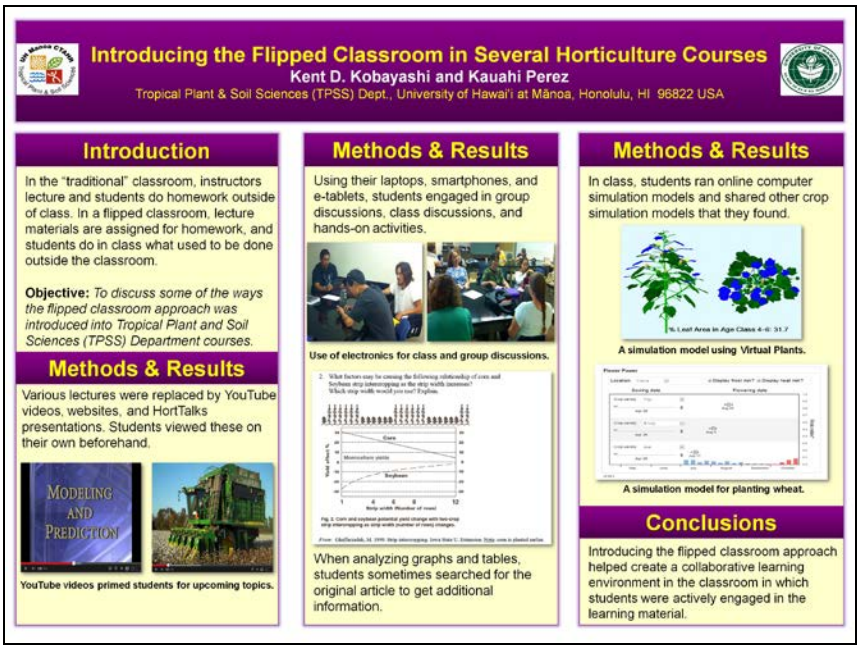

Figure 5. Our poster displayed at the 2013 Annual Conference of the American Society for Horticultural Science in Palm Desert, CA. Visually appealing colors and large, high resolution photos were used to attract viewers from afar.

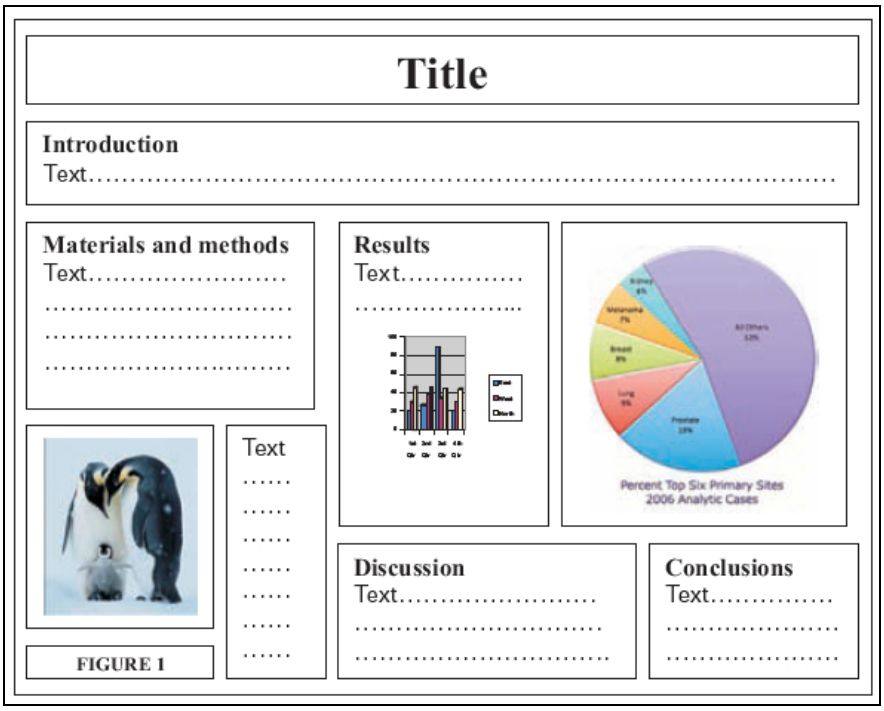

Figure 6. Example of the organization and layout of a poor scientific poster. From: Kaimal and Thappa, 2010. Authors, Affiliations, and Acknowledgements sections are missing. Discussion section may be omitted. Poor organization and layout hinder the viewer's eye flow.