Hybrid – A New Way to Go?  
A Case Study of a Hybrid Safety Class

Carol Boraiko  
Associate Professor  
Engineering Technology Department

Thomas M. Brinthaupt  
Professor  
Department of Psychology

Corresponding author:  
Carol Boraiko  
Associate Professor  
Engineering Technology Department  
Box 19  
Middle Tennessee State University  
Murfreesboro, TN 37132  
USA  
615.898-2106  
615.494-8799 fax  
cboraiko@mtsu.edu

Bio-sketches  
Carol Boraiko

Carol Boraiko, PhD, CSP, CIH worked as a Health and Safety professional for over 25 years. She currently teaches undergraduate and graduate courses in Occupational Health & Safety at Middle Tennessee State University. She has a PhD in Health Studies from Temple University, and a MPH from University of South Florida.

Tom Brinthaupt, Ph.D., received his doctoral degree from the University of Pittsburgh in Social/Personality Psychology. His major research interests include personality, self, and health psychology. He is also interested in the use of
instructional technologies and determining ways to provide students with more realistic expectations for their courses.

**Abstract**

Much has been written about the relative advantages of face-to-face, hybrid, and online course formats. In this paper, the authors describe the process and challenges of converting a face-to-face safety course for engineering technology majors to a hybrid format. They review the literature on the use of hybrid safety courses in college settings and describe the development of a course which provides the traditional safety material in addition to a student team presentation on a safety-related topic. Positive student evaluative data are reported. Finally, suggestions are provided for the development of this type of class to meet the needs for a flexible safety course.

**Keywords:** Hybrid format, online format, safety course, student presentations, student perceptions
Introduction

According to the Occupational Safety and Health Administration (OSHA), there were 4.2 million occupational injuries and illnesses among U.S. employees in 2005 and in 2006, 5,703 employees lost their lives on the job (OSHA, 2007). Another way of stating the problem: 4.6 of every 100 employees experienced a job-related injury or illness in the U.S. These statistics indicate the potential for workers to be unaware of basic safety facts in associated with their work. Because of this potential, it was decided to include a required class to ensure that college graduates have an awareness of safety requirements.

Education on the concepts of safety is a recognized method to improve on-the-job performance by reducing accidents (Krieger, 1997; Laing, 1997). Since one of the goals of Engineering Technology departments is to prepare students to become active in engineering fields, it is crucial that students should be aware of the requirements to do their work safely. An important goal of safety education is to provide the student (or worker) with an increased level of expertise in assessing and controlling safety problems (Goetsch, 2005). According to the American Society of Safety Engineers (ASSE), professionals must acquire knowledge in all areas of their work through education so others can rely on their judgment (DeSiervo, 2004). NIOSH has developed the Prevention through Design process to stress safety needs in the design phase to reduce work related risks in the construction field (NIOSH, 2008).
The majority of safety training is job-specific or considered to be a type of applied instruction. For this type of training, the safety organization of a workplace develops and delivers training to their workers on how to identify and avoid the safety hazards specific to their jobs (Goetsch, 2005; Laing, 1997). The knowledge gained from this type of job-specific safety training differs from that obtained in the safety awareness college-level course typically taken by engineering students. The college-level safety course is designed to provide the students with the tools to identify safety related hazards and determine corrections for any impending engineering tasks. Much of the job-specific training is conducted in a hybrid or blended format; this typically involves online (or computer-based) training followed by hands on, face-to-face, instruction using the equipment present in the workplace. To take advantage of the success of the online or hybrid format for the job-specific training, the authors decided to adapt this format for the college-level safety course.

In discussing the popularity of online and hybrid courses, the ways that a safety class for engineers could benefit from online delivery has centered on students time and needs (Fender, 2002) and continuing education (Carlson, 2001). This article briefly describes the development of a face-to-face safety class for engineers, the sequential development and implementation of the online version, and the eventual hybrid version of the course.
Development of a Required Safety Class for Engineering Technology Majors

The Engineering Technology (ET) department is part of a large southeastern U.S. comprehensive public university of over 25,000 students. Currently, the ET department has approximately 1000 undergraduate majors, a master’s program, and 23 full-time faculty. It has three primary undergraduate concentrations: Engineering Technology (including electromechanical, mechanical, and computer), Construction Management, and Concrete Management. A large number of the students who graduate from this department go on to work in the design or construction fields.

The Industrial Safety course is a senior-level, 3-credit course that is required for all ET majors. The objective of this course is to provide the student with an understanding and familiarity of the basic components of a comprehensive occupational safety, health, and environmental program in industry. The original format of the class included requirements for each student completing a thorough safety inspection using a checklist, a presentation on a safety topic, and three open-book tests. It was felt these assignments required the students to learn how to find the applicable safety-related information for their specific instances. The safety inspection was adopted to allow the students who are working (either as an employee or student intern) to learn the safety requirements and laws specific to their work environment. The open-book tests allowed the students
practice in locating the correct safety-related information rather than memorize safety facts (for the short term only).

In the face-to-face version of the class, the assignment for a presentation of a safety topic was expanded to a team presentation. The purposes of this assignment were varied; conducting the research for the presentation provides students with the opportunity to learn their chosen safety topic in depth. The size of the team was set at between 4 and 6 to allow the students a sufficient number of members to work with. The requirement for the team presentation obliged the students to work with others, simulating the “team concept” in the working world. Finally, giving a presentation as a student provided much needed practice for speaking in public, which is very useful for the working world.

**Development of the Online Version of the Course**

As the ET department’s construction-related concentrations grew, the faculty recognized the need for offering a specialized concentration targeted toward electrical construction. The student pool for this specialization was not local, creating the need for a complete online offering of the courses. It was clear that the safety class could be adapted to an online format. After teaching the face-to-face version of the class for a few years, an online version was developed.

Online classes have been increasing in popularity (Allen & Seaman, 2006; Bonk & Graham, 2006). Because of its “virtual” presentation, an online course saves
space and other campus resources. The online version of the course was developed to fit into the 15-week semester format. It was asynchronous and self-paced, the students had 5 days to do each weekly assignment. The class instruction included research on assigned safety and health websites, viewing videos, and a few PowerPoint presentations. The delivery method utilized an online course management system, DesireToLearn (D2L). One advantage of the online format is the incorporation of web-based links to safety resources, allowing the students to explore the various safety-related websites. In the face-to-face format, exploring these links cut into class time. It was found that when the students looked at the resources on their own, some of them went beyond the required link and investigated areas that related to their work. The D2L course management system allows the instructor to see the amount of time individual students access each link in the course. This information is used to keep the links relevant to encourage additional research by the students.

At the suggestion of the “online course development mentor” (provided as part of the university’s faculty instructional development), it was decided to include required discussion forums as a component of the online version of the course. Online discussion forums allow for ample class discussions. They also allow the instructor to cover additional material. For example, at the start of the term, the online students first participate in a discussion on “whether safety is a benefit to industry.” Additional discussions include specific safety tools, the usefulness of government safety regulations, whether Workers Compensation is beneficial, and
safety ethics. In addition, semester-long discussion topics were offered that allow students to introduce themselves to their classmates, ask advising questions, report problems with the course operation, and visit with each other in a “class lounge.” These “non-safety” discussions, modeled after “best practice” recommendations for creating an interactive online community (Palloff & Pratt, 1999), allow the students a mechanism to acquire feedback and insights from their fellow students and their instructor.

**Development of the Hybrid Version of the Course**

Given the importance of the team presentation on a safety topic, the class structure was changed from a purely online design to a hybrid format to accommodate this aspect of the course. As stated by Garrison and Vaughan (2008), blended learning courses (or hybrid in the university’s language) should include a restructuring of the class to “enhance engagement” for the students. Shibley (2009) affirms that hybrid courses should include the best of the face-to-face and online formats.

The university has the following definition for a hybrid course: a minimum of 80% online, up to 9 hours on-campus can be required. These guidelines dictated the structure of the hybrid version of the course. Having a maximum number of meeting hours per semester, the following schedule was set:
• A 1-hour meeting at the beginning of the semester to describe the team presentation. This meeting also allowed the students to meet each other and form their teams for the presentations.

• Two 3-hour meetings for each group near the end of the semester for the actual presentations.

Because this class is a requirement for all of the students in the ET department, it can be a large class -- approximately 125 students per semester. In order to accommodate the large class size and the maximum 9 hours meetings per semester, the online course management system was set to randomly divide the class into three groups. These three groups allowed the six hours of presentation times for each group to be scheduled, thus permitting each team sufficient time for their 15-minute presentation in front of their entire group.

The newly developed hybrid safety course is a combination of basic safety information, conducting a safety inspection, and a team presentation. As mentioned in the introduction, its intent is to increase the awareness of safety issues for the students when they enter their chosen career.

**Challenges with the Development of the Hybrid Version of the Course**

Several challenges emerged when first developing the hybrid version of the course. The first was choosing the mandatory meeting times to minimize conflicts with other required classes. As St. Clair (2009) indicated, scheduling
can be problematic with a hybrid course. Because there were only three meetings for each student, some attempted to schedule other classes that met during the mandatory meeting times. Some of the other conflicts included: presentations to potential employers, special study periods for courses, and degree capstone projects. Some students believed they could “arrange their schedule” around the mandatory meeting times for their presentations; however this usually resulted in them missing their scheduled presentation time.

Another difficulty with the hybrid version of the course was the students selecting their members for the team presentation. In the face-to face version of the class, the students had many opportunities to meet and interact with each other. This seemed to make the choosing of their team members easier. In the hybrid version of the class, the only time the students met was the first meeting at the beginning of the course. If they did not choose their team members then (and most did not), there appeared to be a great reluctance on their part to form teams.

**Evaluation of the Hybrid Course**

*Participants.* In order to assess the strengths and weaknesses of the hybrid course, a voluntary end-of-semester course evaluation survey was offered to all students. This is recommended as a tool to evaluate the course and to aid in the improvement of the course (Garrison & Vaughan, 2008). The specific course evaluated had 76 students; it was the first time it was taught in the hybrid format.
Eighteen students enrolled in the class did not attend their presentations, resulting in 58 of the students (8 women, 50 men) from the three groups of the course completing the survey.

*Design and Materials.* Students completed the course evaluation survey during the meeting times for the presentations in the final week of the course. Although the surveys were completed anonymously, an exact count of male and female respondents was possible because the survey was given during the face-to-face class in which attendance was taken.

The course evaluation survey consisted of 17 items reflecting the various components of the course. Students rated each item using a 5-point Likert scale (1 = *strongly disagree*, 2 = *disagree*, 3 = *neutral/don’t know*, 4 = *agree*, 5 = *strongly agree*). Table 1 presents the items. In addition, students completed open-ended questions about what they most liked and disliked about the course (Brinthaupt, 2004). Table 2 shows the percentages of the students responses based on the Likert scale.

*Results.* Using *t*-test analyses, student ratings were compared against the scale midpoint. As Table 1 indicates, except for the presentation being a useful learning tool (about 1/3 of the class disagreed with its usefulness), students were positive about the hybrid course. Students agreed that there were both positive and negative aspects of the course. Of the positives aspects, the students
indicated they learned more than they expected, the various components of the course were helpful or useful, they learned a lot from the course, and would recommend it to other students.

Conclusions

Based on the success of the hybrid version of this safety course, schools with required safety courses for non-safety majors should consider the benefits of hybrid delivery. Expanding the online format to a hybrid version allows for the addition of enhancements to the education process, such as student presentations on topics integral to the course subject. As described earlier, the students’ presentations serve to increase their expertise of their presentation topic and it provides the students with an all-important opportunity to practice public speaking. Courses such as industrial safety are especially amenable to the hybrid format. There is a lot of material to be covered; however, it is also important to allow students the opportunity to develop their own areas of interest and expertise. The team presentations provide students with that opportunity. Courses with similar goals (either within or outside of engineering technology) would likely benefit from adopting a hybrid delivery format.

The students mentioned in the open-ended questions in the survey that they liked the flexibility of the schedule the hybrid format allows. Several mentioned that the format of this class allowed them to complete the course work without interfering with the demands of the classes that directly related to their major.
The hybrid format can be beneficial for a large class where the course material is not an integral part of the students’ major courses. It allows the students the freedom to engage in the course material without sacrificing a class time slot.

To continue to improve the course, additional surveys are planned to assess the benefits of the specific aspects of the class to the students. In the near future, the course will be taught in an online only format, without the presentations, the results of the surveys from the online format will be compared to the responses from the survey for the hybrid format.
References


Fender, D. 2002. Student and Faculty Issues in Distance Education Occupational Safety and Health Programs. Journal of Safety Research. Vol. 33 Issue: Number 2 p175-193, 19p


<table>
<thead>
<tr>
<th>Course Evaluation Measure</th>
<th>Mean</th>
<th>SD</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. There were many negative aspects of this course that I did not expect.</td>
<td>3.33</td>
<td>.866</td>
<td>**</td>
</tr>
<tr>
<td>2. There were many positive aspects of this course that I did not expect.</td>
<td>2.79</td>
<td>1.056</td>
<td></td>
</tr>
<tr>
<td>3. I was pleasantly surprised by certain aspects of this course.</td>
<td>3.52</td>
<td>.800</td>
<td>***</td>
</tr>
<tr>
<td>4. I was unpleasantly surprised by certain aspects of this course.</td>
<td>2.86</td>
<td>1.067</td>
<td></td>
</tr>
<tr>
<td>5. I learned more in this course than I expected to learn at the beginning of the term.</td>
<td>3.41</td>
<td>1.124</td>
<td>**</td>
</tr>
<tr>
<td>6. This course was more difficult than I expected it would be at the start of the term.</td>
<td>2.83</td>
<td>1.230</td>
<td></td>
</tr>
<tr>
<td>7. The amount of work required for this course was appropriate.</td>
<td>3.72</td>
<td>1.039</td>
<td>***</td>
</tr>
<tr>
<td>8. I found the textbook for this course to be helpful.</td>
<td>3.97</td>
<td>1.139</td>
<td>***</td>
</tr>
<tr>
<td>9. I found the &quot;Learn More About It!&quot; web resources for this course to be helpful.</td>
<td>3.10</td>
<td>1.150</td>
<td></td>
</tr>
<tr>
<td>10. I found the Safety Inspection Report to be a good learning tool.</td>
<td>3.19</td>
<td>1.263</td>
<td></td>
</tr>
<tr>
<td>11. I found the Team Presentation of a safety topic to be a good learning tool.</td>
<td>2.98</td>
<td>1.217</td>
<td></td>
</tr>
<tr>
<td>12. I found the class discussions to be helpful.</td>
<td>3.67</td>
<td>.913</td>
<td>***</td>
</tr>
</tbody>
</table>
Table 1 (continued)

<table>
<thead>
<tr>
<th>Statement</th>
<th>Mean</th>
<th>Std. Error</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>13. I found the class “web-reading” assignments to be helpful.</td>
<td>3.61</td>
<td>.901</td>
<td>***</td>
</tr>
<tr>
<td>14. The instructor's &quot;help resources&quot; for this course were useful.</td>
<td>3.56</td>
<td>.802</td>
<td>***</td>
</tr>
<tr>
<td>15. This course helped me to develop a greater understanding of the role of Safety in my work.</td>
<td>4.02</td>
<td>1.009</td>
<td>***</td>
</tr>
<tr>
<td>16. Overall, I would say that I learned a lot in this course.</td>
<td>3.56</td>
<td>1.069</td>
<td>***</td>
</tr>
<tr>
<td>17. I would advise other students to take this course from this instructor.</td>
<td>3.93</td>
<td>.997</td>
<td>***</td>
</tr>
</tbody>
</table>

Note. Because of missing data, N ranged between 56 and 58. Students used a 5-point rating scale (1 = strongly disagree, 5 = strongly agree); t-tests compared means against the midpoint (3) of the scale. * p < .05; ** p < .01; *** p < .001

Table 2

Percentages for the Evaluation of Hybrid Course Components

<table>
<thead>
<tr>
<th>Likert Scale</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage</td>
<td>6.8</td>
<td>13.6</td>
<td>25.8</td>
<td>37.9</td>
<td>15.1</td>
</tr>
</tbody>
</table>