Stan Guidera, Bowling Green State University

DR. STAN GUIDERA is an Associate Professor in the Architecture/Environmental Design Studies Program in the College of Technology at Bowling Green State University. He teaches design studios, advanced CAD and computer modeling courses, and advanced computer rendering and animation classes. He is a registered architect and has used computer-aided design extensively in design studios as well as in professional practice.
Integrating Study Abroad and Cooperative Education: 
A case study

Abstract

This paper discusses an alternative to the conventional cooperative education model that was developed in response to student demand for an international experience course for architecture majors. An overview for the class is provided, including a discussion of both activities and challenges associated with developing, organizing, and conducting the course. The rationale for establishing the equivalency of the course experience and the existing cooperative education requirements are discussed, followed by a discussion of learning outcomes, assessment procedures, and conclusions.

Introduction

As a discipline, architecture has a long tradition of study abroad. However, in contrast to architecture programs at nearly all other institutions, there are currently no formal study abroad options available to architecture students in the College of Technology at Bowling Green State University (BGSU). While there are alternative study abroad options available, such as study abroad programs offered by other institutions, they are not without disadvantages. For example, other institutions typically offer these programs in the summer in order to accommodate the course sequence associated with professional degree programs. The architecture program at BGSU follows a similar curriculum structure leaving summer semester as the only viable option for study abroad. However, the curriculum schedule identifies summer semester as the time period for students to complete each of the three full-semester cooperative education experiences mandated by the college. Therefore, the combination of cooperative education requirements and the demands of an undergraduate course sequence have proved problematic for students considering enrolling in the study-abroad courses offered by other institutions as well as for the development of study abroad options that would be offered by BGSU.

There are important benefits that are derived from incorporating cooperative education within a curriculum. The goal of cooperative education is to provide students with a mechanism to gain applied experience in their field prior to graduation through a structured course activity in which theories and principle learned in the classroom are reinforced and given concrete application while on a co-op assignment [1]. The origins of cooperative education as a component in curricula can be traced to Herman Schneider, an engineer, architect, and Dean of Engineering at the University of Cincinnati from 1906 – 1928, who had concluded that the traditional classroom was insufficient for technical students [2]. Contemporary models follow one of two predominant forms: a model in which students alternate a semester of academic coursework with an equal amount of time in employment, or a model in which the employment occurs in parallel with coursework activities [3]. Advocates have suggested that cooperative education programs benefit students through greater motivation, career clarity, enhanced employability, and vocational maturity, and employers by providing labor force flexibility, enhanced recruitment/retention of trained workers, and a mechanism for providing input into curricula [3]. However, cooperative education has also been criticized for “the lack of well-done research that empirically demonstrates these benefits” [4] and has also been criticized for placing too much
emphasis on placements rather than learning, and for its emphasis and focus on administration, logistics, placements, and procedures [5].

Another criticism, particularly relevant to educators in technical fields with highly structured curriculum aligned with professional accreditation criteria, is that cooperative education is viewed as taking time away from the classroom [6]. As educators in design and engineering fields are challenged to revise curriculums to respond to the rapidly changing demands of society as well as the workplace, cooperative education requirements can pose obstacles to advancing new initiatives. While it has been proposed that “there is a need for broader definition of acceptable models for integrating work and learning” [5], alternatives that address both the need for applied experiences in the workplace while addressing other equally important curricular goals must be considered.

Cooperative education at Bowling Green State University is primarily aligned with the first of the two models; students typically attend classes for two semesters and then work a full semester in their field. Historically, the cooperative education administration at BGSU had approved only limited deviation from the mandatory work-experience and the standard format for completing associated requirements. Therefore, in order to provide BGSU architecture students with an international study opportunity, the faculty proposed the development of a non-traditional alternate to the two common models. The proposed model utilized a compressed work experience that was intended to comply with the intent of the cooperative education mandate (also referred to as a co-op) by integrating a work experience activity into the framework of a short-term study abroad course. Structured learning activities associated with the work experience and rigorous faculty involvement in the process of securing positions at firms abroad was used to insure that a compressed work experience was of sufficient quality and depth to meet the spirit of a cooperative education course requirement and therefore be acceptable as an alternative to one such course.

**Short-term study abroad in architecture: Rationale for the class**

The study abroad option, Architecture Field Experience in the United Kingdom, was organized with all activities centered in London, England, with the exception of two day-trips to nearby cities of Oxford and Windsor. The class was specifically developed as a short-term rather than a full-semester study abroad course. This decision was based on several factors. A short-term class would reduce costs for students [7] and would allow those that needed to work during the summer in order to fund their education to still have an opportunity to participate in the course. Short-term study abroad can yield additional benefits as well. According to Niesenbaum and Lewis [8], short-term study abroad (STSA) is an important alternative for students not likely to participate in semester-long or year-long international study abroad programs. Their assessment of short-term study abroad courses showed that STSA produced benefits to students that included altered course of study, additional travel or study abroad, and increased interest in interdisciplinary studies. They also found that STSA influenced perceptions regarding globalization. Structuring the course as a short-term offering is also aligned with current trends that indicate that there has been declining enrollment in full semester study abroad programs over the last decade. Approximately 56% of U. S. students studying abroad in 2005 selected programs with a duration that was less than one semester [7].
Short-term study abroad programs have been proposed to be of particular benefit to students studying in professional fields, which would include a field such as architecture. Klahr and Ratti [9] stated that while “it is generally assumed that undergraduate students in any major benefit significantly from study abroad, with respect to personal, academic, and pre-professional development,” they also proposed that “for students in all professional programs … it has become increasingly important to acquire global competency.”

It was the goal of the Field Experience in the United Kingdom course to combine the benefits of a structured and academically intensive study abroad experience with a work experience with assignments that paralleled the requirements and outcomes of the mandatory cooperative education courses which are currently part of the BGSU architecture curriculum. As an alternative to conventional cooperative education experiences, there was an emphasis on activities and outcomes of that were intended to facilitate the student’s professional development. However, the professional development opportunity was intended to be a subset of course experience. Emphasizing the importance of reflection in promoting more broad intellectual development, Van Gyn [10] proposed that "if co-op is only a vehicle for experience to gain information about the workplace and to link technical knowledge with workplace application, then its effectiveness is not fully developed." To this end, the course was also intended to draw on the international and cultural experiences associated with the class activities to enhance student’s intellectual development in terms of their understanding of architecture and the global and historical context in which architecture is practiced.

**Course Location:**

The rationale for selecting London, England as the location for the course was based on two factors. First, in the United Kingdom language would not be a communication barrier for students during the course. Minimizing language barriers has been identified as an important factor for student participation. Among U. S. students studying abroad, over one-third typically enroll in programs in which English will be the primary language [11]. In 2004 – 2005, the United Kingdom was the leading destination in the world for U.S. college students with nearly 17% of all American students studying there [7]. Additionally, due to the role of the work experience activities as a primary course activity selecting a location where language would not be a barrier was particularly critical if the students were to maximize benefits from the office experience. Secondly, London’s status as a major economic center, its reputation for cultural diversity, the richness of its historic architectural works, and the large numbers of recently built and in many cases highly acclaimed architectural projects, were among other factors that influenced the selection. These factors were important considerations in meeting course objectives beyond those related to the cooperative education requirement.

**Course Structure:**

As previously noted, while a primary objective of the course was to provide a curricular parallel to the college cooperative education requirement, other activities related to the more general intellectual development were also a high priority. Class components included:
• Four two contact-hour pre-class sessions
• 14 day field experience in London, including sites visits to museums, historical architectural works, and important urban spaces
• 5 1/2 days (44 contact hours) office experience in London (five full work days plus a scheduled ½ day meeting and orientation session the week prior to the work experience).
• A professional practice report
• A six contact-hour post-class session

The following requirements were established for participation in the course:

• Prior cooperative education experience: The students must have at least completed their first cooperative education requirement. Since the work experience was an integral component of the course, it was determined that in order to maximize learning in a short-term work context it would be necessary for students to have previous work experience to facilitate their productivity and to provide context for their office experience in London.
• Advanced CAD: given the significant role of computer aided design in professional practice, it was determined that students must have completed both required computer applications in architecture sequence in order to be positioned to secure a position with a firm in the UK and for that position to allow for students to contribute to operations at that firm which would result in the students deriving the greatest benefit from the field experience component of the course.
• Design Studio: In order for students to optimize their experiences in the course it was determined that design studio experience, and the critical perspective developed in the context of design studio activities, was necessary. Therefore, it was determined that completion of the three introductory studio and graphics courses would to be required as the minimum studio level for participating students.

Class assignments

In addition to structured tours of buildings and sites and on-going sketching assignments, two other class activities were integrated into the course. An assignment designed to parallel the co-op report assigned in the conventional cooperative education courses was developed. However, unlike the more general questions of the conventional co-op report, this assignment was specifically comprised of questions and tasks directed toward architectural practice in order to maximize the learning activities associated with the work experience. The questions were structured to require the students to meet with the supervisors of their host firms and discuss issues that included a variety of technical and practice related topics, such as zoning and building codes. This report required students to research various aspects of professional practice in the UK and draw parallels with the knowledge gained from their prior work experiences. For example, the report included questions directed towards the role of the respective professional organizations in the United Kingdom and the United States, RIBA (The Royal Institute of British Architects) and the AIA (American Institute of Architects), as in architectural practice. Questions pertaining to licensure requirements and academic backgrounds of practitioners were also included. The report questions are included in the appendix.
A second assignment, a research and presentation project, was associated with the structured tours. In addition to more general learning objectives, this assignment was intended to provide the students with a project that could be re-formatted for inclusion in portfolios for graduate school applications. For the second assignment, the students were given sketching assignments at various sites and locations. They were separated into five groups of four and were required to document works of one of five historically significant British architects: Sir Christopher Wren, Sir John Soane, Sir John Nash, Sir Nicholas Hawksmoore, and Inigo Jones. Students were to incorporate their sketches and photographic documentation from site visits to important works and projects by each of these architects, along with information gathered from the class readings as well as the RIBA collections at The Victoria and Albert Museum, into an “electronic” presentation board that would be printed at a resolution of 100 dpi with a size of 30” x 40” (See Figure 1).

Setting up the Work Experience

As the course was conceptualized, four key issues were identified as challenges to organizing an effective course with an integrated work experience. First, due to the decision to offer the course as a short-term study abroad experience it would be necessary to determine if there was sufficient interest on the part of firms in London in order to arrange a work experience for all interested students. It was also necessary to request input from firms in London in order to determine what format for the work experience would generate the most interest while still producing a maximum professional learning experience for the students in the compressed time-frame of the course. Second, it was recognized that for many students making contacts to arrange a work-experience assignment in the UK would prove difficult. Therefore, leaving the responsibility of arranging an international work experience to the students, particularly one for without a precedent, could have proved problematic for many students. As a result, it was determined that it would be necessary to allocate substantial faculty time to establish contacts for the students and provide screening in order to attempt to insure that all students participating not only had work experience opportunities but that the work experiences would be of sufficient quality in order for the students to benefit from the course professionally. Third, due to fluctuations in project workloads and timing of project demands, it was anticipated that the firms that were interested in participating in the program would be unable to commit to hosting a student several months in advance, which would result in some degree of uncertainty as the course developed. Last, if the students were to be compensated financially for their time at the offices in the UK, they would be required to receive UK work visas. This was complicated by a variety of factors, including additional expenses that would be incurred in applying for and receiving visas for the students, the extended time frame for the application process (particularly in light of the time frame for the final selection of students participating), and the inability for many of the firms in the UK to commit until mid to late spring. As a result, the work experience was proposed as an unpaid internship/field experience.

Initial contact with firms in London was made via e-mail in August 2004. This correspondence was sent to all London area firms listed on the Royal Institute of British Architects internet site in order to determine the level of interest in participating in the program as well as to gather input regarding how the work experience may be optimally structured to meet the requirements of participating firms. Over 200 firms responded, with over 100 indicating they would consider
participation. After a second e-mail was sent requesting additional input, the determination was made to integrate a full week work assignment into the class proposal. In order to help maximize the experience for the students, pre-trip classes were also included to address a variety of professional practice issues. As anticipated, several firms indicated interest in participating but stated they would be unable to make a firm commitment until closer to the actual work period.

In February 2005, just over thirty firms were “short-listed” for the course based on their indications that they would agree or likely agree to host a student for the work experience. These firms were then sent a list of questions in order to gather more detailed information regarding their practices, project specializations, the software used in their office or offices, and their preferences for being assigned students with any particular skills or interests. While most indicated they worked on a variety of project-types, firm specializations included retail interiors, historic preservation and restoration, custom (“one-off”) residential, and office development. The firm sizes ranged from sole-practitioners to offices with over 100 employees. One office was the London branch of a firm based in the United States.

Once the final students were selected, they were provided a MS Word template to develop a one-page “personal profile” that included a photograph, a short description of their personal interests and prior work experiences, their GPA along with a summary of course-content they had completed, and a list of skills related to software and other areas of potential interest to host-firms. The profiles were then compiled and sent as a PDF file to firms in the UK requesting a response if there was a specific student that they were interested in having assigned to their office. However, the firms as well as the students were told that final assignments would be determined by faculty at BGSU. All students’ assignments were finalized four weeks prior to departure. At that time, students were required to contact their assigned host firm for information on office dress codes or standards, typical work-day schedules, and the recommended transportation modes and routes to and from the lodging.

**Student Participant and selection**

The course was approved with a minimum enrollment of 10 students. After the initial class announcement, 26 students indicated an interest in participating. No students indicated that the unpaid work experience would prevent them from participating. By January 2005, after costs were finalized pending payment of lodging costs which were subject to currency fluctuation between the United States Dollar (USD) and the British Pound (GBP), 16 students were selected using the following criteria:

1) Class standing: Seniors were given priority
2) Overall Grade Point
3) Grade point in Architecture Courses

The 16 students who participated included six females and 10 males. Of these, seven had completed one cooperative education course prior to the class, seven had completed two cooperative education courses, and two had completed all three requirements. Seven students had completed their third year design studio sequence and nine had completed their fourth year
Assessing the Effectiveness of the Course

As noted in the introduction and class overview, it was the intent of this course to combine the benefits of a structured and academically intensive study abroad experience with a work experience with assignments that paralleled the requirements and outcomes of the mandatory cooperative education courses which are currently part of the BGSU architecture curriculum. Therefore, assessment was primarily based on the extent to which the students felt they benefited both professionally and academically. A survey administered to the students during the post-class meeting was used as the primary assessment tool. A second survey sent to the participating firms was used to gain insight into the architect’s perspective on the work experience. The two-section student survey included likert-scale questions as well as open-ended response questions. The first section asked students to evaluate the overall quality of the course experiences and to collect general data related to instructional quality. The second section was also used to assess the effectiveness of the class in developing professional and practical (applied) knowledge and skills as well as their general understanding and knowledge of architecture, and to assess the student’s perception of the effectiveness of the course as a substitute for a cooperative education course.

The interpretation of the statistical analysis of the survey responses was subject to a variety of limitations associated with the use of likert-scale based instruments. For example, the limitations include assumptions that there is consistent interpretation among all respondents of the meaning of likert-scale responses as well as the difference between, terms such as “agree” and “strongly agree.” Similarly, it is assumed that the responses are not influenced by factors such as the Hawthorne Effect and that the responses accurately reflect the respondent’s perceptions.

Instructor Observations

Pre-trip assignments and class meetings were used to prepare the students for their work experiences. Activities included sketching assignments, readings related to architectural history and theory, discussions of historical and contemporary English architecture, and a general overview of practice issues in the UK. As several of the participating firms had indicated they used Vectorworks for CAD drafting and design, a license was secured in order to help students prepare in advance. However, two deficiencies in the pre-class preparation emerged during the work experience itself. First, despite the advance preparation, several students were not adequately prepared to use Vectorworks in a professional setting. More importantly, the students had difficulty adapting to the metric system, particularly in CAD operations.

Post-class survey: Section 1 organization and methodology

In section 1 of the survey, respondents were asked nine questions intended to rate the class instructor on content and delivery relative to the following: knowledge of subject, organization of information, presentation of topics, and overall quality of instruction, practicality of content covered, pace of instruction, clarity of content, amount of content, and overall quality of content. These questions
used a 5-point scale with a rating of 5 indicating Excellent and a rating of 1 indicating Poor. Students were also asked to respond to five open-ended questions.

The responses were analyzed using SPSS Version 11. A variable was set up for each of the nine likert-scale response questions using a scale of 1 through 5, with 5 corresponding to Excellent and 1 corresponding to Poor. Ordinal measurement was used for the nine variables. A value of three was determined to be a neutral response. The frequency distributions of these responses were calculated. The responses were then analyzed using one-sample t-tests with a confidence interval of .95 (α = .05) with a test value of three (associated with a response of neutral). While analysis using t-tests is more appropriately utilized in calculations associated with interval rather than ordinal data, this analysis assumed that multiple responses to ordinal-scale questions would be used to establish a “trend” and therefore could be treated as interval data in statistical analysis.

**Analysis and results**

Twelve students (75%) returned the Evaluation Form. Analysis of the frequency distribution produced the following for the seven items:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Rating Mean</th>
<th>Rating Median</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructor knowledge of subject:</td>
<td>4.50</td>
<td>5</td>
<td>4 - 5</td>
</tr>
<tr>
<td>Organization of Content</td>
<td>4.58</td>
<td>5</td>
<td>3 - 5</td>
</tr>
<tr>
<td>Presentation of topics</td>
<td>4.50</td>
<td>4.5</td>
<td>4 - 5</td>
</tr>
<tr>
<td>Overall Quality of Instruction</td>
<td>4.67</td>
<td>5</td>
<td>4 - 5</td>
</tr>
<tr>
<td>Practicality of content</td>
<td>4.92</td>
<td>5</td>
<td>4 - 5</td>
</tr>
<tr>
<td>Pace of instruction</td>
<td>4.58</td>
<td>5</td>
<td>2 - 5</td>
</tr>
<tr>
<td>Clarity of Content</td>
<td>4.75</td>
<td>5</td>
<td>3 - 5</td>
</tr>
<tr>
<td>Amount of Content</td>
<td>4.75</td>
<td>5</td>
<td>4 - 5</td>
</tr>
<tr>
<td>Overall quality of Content</td>
<td>4.75</td>
<td>5</td>
<td>3 – 5</td>
</tr>
<tr>
<td><strong>Total Class Average:</strong></td>
<td><strong>4.67</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Analysis of the data using one sample t-tests comparing the mean of the responses to nine questions to the test value of three found that the respondent’s ratings were statistically significant for all questions. The results are documented in the following table.

**One-Sample t-Test: Test Value=3, α = .05**

<table>
<thead>
<tr>
<th>Variable</th>
<th>t</th>
<th>df</th>
<th>Sig. (2-tailed)</th>
<th>Mean Difference</th>
<th>95% Confidence Interval of Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lower</td>
</tr>
<tr>
<td>Instructor knowledge of subject:</td>
<td>10.652</td>
<td>11</td>
<td>.000</td>
<td>1.58</td>
<td>Upper</td>
</tr>
<tr>
<td>Excellent to Poor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aspect</td>
<td>Mean</td>
<td>StDev</td>
<td>Skew</td>
<td>Kurtosis</td>
<td>N</td>
</tr>
<tr>
<td>----------------------------------------------------------</td>
<td>------</td>
<td>-------</td>
<td>------</td>
<td>----------</td>
<td>---</td>
</tr>
<tr>
<td>Organization of Content: Excellent to Poor</td>
<td>8.204</td>
<td>11</td>
<td>.000</td>
<td>1.58</td>
<td>1.16</td>
</tr>
<tr>
<td>Presentation of topics: Excellent to Poor</td>
<td>9.950</td>
<td>11</td>
<td>.000</td>
<td>1.50</td>
<td>1.17</td>
</tr>
<tr>
<td>Overall Quality of Instruction: Excellent to Poor</td>
<td>11.726</td>
<td>11</td>
<td>.000</td>
<td>1.67</td>
<td>1.35</td>
</tr>
<tr>
<td>Practicality of content: Excellent to Poor</td>
<td>23.000</td>
<td>11</td>
<td>.000</td>
<td>1.92</td>
<td>1.73</td>
</tr>
<tr>
<td>Pace of instruction: Excellent to Poor</td>
<td>6.092</td>
<td>11</td>
<td>.000</td>
<td>1.58</td>
<td>1.01</td>
</tr>
<tr>
<td>Clarity of Content: Excellent to Poor</td>
<td>9.753</td>
<td>11</td>
<td>.000</td>
<td>1.75</td>
<td>1.36</td>
</tr>
<tr>
<td>Amount of Content: Excellent to Poor</td>
<td>13.404</td>
<td>11</td>
<td>.000</td>
<td>1.75</td>
<td>1.46</td>
</tr>
<tr>
<td>Overall quality of Content: Excellent to Poor</td>
<td>9.753</td>
<td>11</td>
<td>.000</td>
<td>1.75</td>
<td>1.36</td>
</tr>
</tbody>
</table>

Responses to the open-ended questions were sorted by question and then placed under three categories in terms of the content and experience of the class: Positive, Negative, and Neutral.

In response to “what did you like most about this workshop,” 11 students provided a response. Responses categorized as Positive were the following:
- The opportunity to see many architectural buildings in London that are much different than the US
- Getting a different perspective
- The amount of architecture – new and old – was incredible
• Practical knowledge gained
• Field experience in London
• Being able to travel and then work hands-on, being able to study and see what you are studying makes the experience a whole lot better
• Taking the trips to Oxford and Windsor, and also seeing the museums
• (Seeing) architectural styles in London, the work environment of London, the way architectural firms work and how different and similar their work is from here

Two responses categorized as neutral were:
• The fact that I had a chance to study overseas
• It was a trip to London. That’s Sweet!

In response to “What did you dislike most about the workshop” there were nine responses of which three were considered Positive, five Negative, and one Neutral. The three responses categorized as Positive were the following:
• Nothing
• Not one thing! The experience was great!
• Nothing

The four responses categorized as Negative in identifying what the participants liked the least were the following:
• Not being able to go into all the buildings due to security restrictions
• Long flight and lots of walking, but I got over it
• Some of the side trips
• The only thing was the expense
• The work in the firm would have been better spent seeing sites

The one response categorized as Neutral in was the following:
• The accommodations were nice but could have been a little better. Great Location though

In response to “Were the times/dates the workshop was scheduled conducive to your schedule” there were eight responses, six Positive and two Negative. The six responses categorized as Positive were the following:
• This was good for me.
• Fine
• Yes
• Yes
• Yes
• Yes

The two responses categorized as Negative were:
• I think we needed more of a break from the end of school
• I think that when we left there should have been more time after the semester ended. I felt rushed
Post-class survey: Section 2 organization and methodology

The second survey section was developed in order to assess the student’s perception of the effectiveness of the course organization and content in advancing the student’s academic as well as professional knowledge base in architecture. The survey included questions which were specifically directed toward assessment of the course in advancing student development relative to student’s prior cooperative education experiences. The questions were structured to use the student’s previous cooperative education experiences as a reference for their responses.

This section of the survey was sub-divided into three sub-sets: the first sub-set was composed of seven likert-scale questions, the second section included three open-ended questions, and the third section collected demographic information. Survey questions one and two asked students to rate the extent to which they felt their participation in the class increased their understanding of professional practice and the extent to which they gained useful practical knowledge from the work assignment class component. The third question asked students to rate the extent to which they felt their participation in the class increased their useful practical knowledge. The responses were structured using a five-point scale with options of “strongly agree,” “agree,” “neutral,” “disagree,” and “strongly disagree.” Questions four through seven asked students to rate the extent to which they felt their participation in the class increased their understanding relative to their prior cooperative education experiences. Using a five point scale, students were asked to rate the knowledge gained through work experience, the knowledge gained from the class overall, the applicability of knowledge to their professional future, and the applicability of knowledge to their academic future. The responses were structured using as five point scale with options of “considerably less than my previous co-op,” “less than my previous co-op,” “about the same as my previous co-op,” “more than my previous co-op,” and “considerably more than my previous co-op.”

The response to questions one through three were configured as ordinal measurements and assigned a value of one through five, with a value of five assigned to the response of “strongly agree” and a value of one assigned to a response of “strongly disagree.” A value of three was assigned to “neutral,” which was interpreted as a neutral response. Similarly, the response to questions four through seven were configured as ordinal measurements and assigned a value of one through five, with a value of five assigned to the response of “considerably more” and a value of one assigned to a response of “considerably less.” A value of three was assigned to “about the same,” which was interpreted as a neutral response. The frequency distributions of these responses were calculated and the responses analyzed using one-sample t-tests with a confidence interval of .95 (α = .05) with a test value of three (associated with a response of neutral). While analysis using t-tests is more appropriately utilized in calculations associated with interval rather ordinal data, this analysis assumed that multiple responses to ordinal-scale questions would be used to establish a “trend” and therefore could be treated as interval data in statistical analysis. As a result, analysis of mean scores would indicate positive or negative the perceived effectiveness of the class relative to the extent to which the mean for the responses to each question was above or below the neutral ranking of three.

The questions in the second sub-set were used to collect data regarding the student’s perception of the length of the overall class as well as the length of the work experience component of the course. The available responses to these two questions were “yes,” “not sure,” and “no.” Four additional questions were included to collect data regarding the highest level studio completed, the highest
level co-op completed, how the class would be used (as a technical elective, as a co-op substitution, or if they were not sure), and the number of semester hours completed. These data, along with the student’s GPA, were used for non-parametric bi-variate analysis using Kendall’s tau-b to determine if there were correlations with the responses to the initial seven questions of the survey.

Three open-ended questions were included in the third sub-set. The first question asked the participants to explain their ratings for both the applicability of the knowledge gained to their professional future (Q7) and the applicability of the knowledge gained to their academic future. The responses to this question were then used to provide insight into the statistical analysis of the likert-scale questions. The next two questions asked the participants to identify the two activities they perceived as most beneficial and the two activities they perceived as contributing the least to the course.

Analysis and results

The frequency analysis of the seven likert-scale questions yielded the results documented in the following tables. For questions one through three, which utilized a ranking ranging from “strongly disagree” to “strongly agree,” the frequency distributions are documented in the following table:

<table>
<thead>
<tr>
<th>Frequency Distribution: Q1 through Q3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1: understanding of professional. practice increased</td>
</tr>
<tr>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>Q1: understanding of professional. practice increased</td>
</tr>
<tr>
<td>Q2: gained useful practical knowledge from work assignment</td>
</tr>
<tr>
<td>Q3: gained useful practical knowledge from class overall</td>
</tr>
</tbody>
</table>

The frequency analysis of the seven likert-scale questions yielded the results documented in the following tables. For questions one through three, which utilized a ranking ranging from “considerably less than previous co-op” to “considerably more than previous co-op,” the frequency distributions are documented in the following table:

<table>
<thead>
<tr>
<th>Frequency Distribution: Q4 through Q7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q4: Knowledge gained through work experience</td>
</tr>
<tr>
<td>--------------------------------------</td>
</tr>
<tr>
<td>Q4: Knowledge gained through work experience</td>
</tr>
<tr>
<td>Q5: knowledge gained from class overall</td>
</tr>
<tr>
<td>Q5: knowledge gained from class overall</td>
</tr>
</tbody>
</table>
Q6: applicability of knowledge to professional future  
<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>14</td>
<td>4.57</td>
<td>.646</td>
<td>.173</td>
</tr>
</tbody>
</table>

Q7: applicability of knowledge to academic future  
<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>14</td>
<td>4.29</td>
<td>.726</td>
<td>.194</td>
</tr>
</tbody>
</table>

Analysis of the mean yielded the following results that were used in the t-tests followed by the t-test results for questions one through seven:

<table>
<thead>
<tr>
<th>Question</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
<th>t</th>
<th>df</th>
<th>Sig. (2-tailed)</th>
<th>Mean Difference</th>
<th>95% Confidence Interval of Difference</th>
<th>Lower</th>
<th>Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1: understanding of professional practice increased</td>
<td>14</td>
<td>4.57</td>
<td>.646</td>
<td>.173</td>
<td>8.20</td>
<td>11</td>
<td>.000</td>
<td>1.58</td>
<td>1.16 to 2.01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q2: gained useful practical knowledge from work assignment</td>
<td>14</td>
<td>4.33</td>
<td>.852</td>
<td>.228</td>
<td>5.45</td>
<td>11</td>
<td>.000</td>
<td>1.42</td>
<td>.84 to 1.99</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q3: gained useful practical knowledge from class overall</td>
<td>14</td>
<td>4.64</td>
<td>.497</td>
<td>.133</td>
<td>11.72</td>
<td>11</td>
<td>.000</td>
<td>1.67</td>
<td>1.35 to 1.98</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q4: Knowledge gained through work experience</td>
<td>14</td>
<td>3.50</td>
<td>1.019</td>
<td>.272</td>
<td>1.59</td>
<td>11</td>
<td>.139</td>
<td>.50</td>
<td>-.19 to 1.19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q5: knowledge gained from class overall</td>
<td>14</td>
<td>4.29</td>
<td>.726</td>
<td>.194</td>
<td>7.34</td>
<td>11</td>
<td>.000</td>
<td>1.42</td>
<td>.99 to 1.84</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q6: applicability of knowledge to professional future</td>
<td>14</td>
<td>4.29</td>
<td>.726</td>
<td>.194</td>
<td>7.09</td>
<td>11</td>
<td>.000</td>
<td>1.33</td>
<td>.92 to 1.75</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

One-Sample t-Test: Test Value=3, $\alpha=0.05$
| Q7: applicability of knowledge to academic future | 4.690 | 11 | .001 | 1.00 | .53 | 1.47 |

One-Sample t-Test: Test Value=3

<table>
<thead>
<tr>
<th></th>
<th>t</th>
<th>df</th>
<th>Sig. (2-tailed)</th>
<th>Mean Difference</th>
<th>95% Confidence Interval of the Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lower</td>
</tr>
<tr>
<td>Q1: understanding of prof. practice increased</td>
<td>9.099</td>
<td>13</td>
<td>.000</td>
<td>1.57</td>
<td>1.20</td>
</tr>
<tr>
<td>Q2: gained useful practical knowledge from work assignment</td>
<td>6.276</td>
<td>13</td>
<td>.000</td>
<td>1.43</td>
<td>.94</td>
</tr>
<tr>
<td>Q3: gained useful practical knowledge from class overall</td>
<td>12.362</td>
<td>13</td>
<td>.000</td>
<td>1.64</td>
<td>1.36</td>
</tr>
<tr>
<td>Q4: Knowledge gained through work experience</td>
<td>1.836</td>
<td>13</td>
<td>.089</td>
<td>.50</td>
<td>-.09</td>
</tr>
<tr>
<td>Q5: knowledge gained from class overall</td>
<td>6.624</td>
<td>13</td>
<td>.000</td>
<td>1.29</td>
<td>.87</td>
</tr>
<tr>
<td>Q6: applicability of knowledge to professional future</td>
<td>6.624</td>
<td>13</td>
<td>.000</td>
<td>1.29</td>
<td>.87</td>
</tr>
<tr>
<td>Q7: applicability of knowledge to academic future</td>
<td>5.491</td>
<td>13</td>
<td>.000</td>
<td>1.07</td>
<td>.65</td>
</tr>
</tbody>
</table>

It should be noted that the tests found that only the mean for Q4 (Knowledge gained through the work experience) was not statistically significant. Additionally, Bi-variate Correlation analysis using Kendall’s tau_b found no statistically significant correlations between the general and demographic data collected.

**Discussion**

While statistical analysis of smaller sample sizes must be interpreted with caution, the data clearly indicated a positive evaluation of the course by the participants. When considering the responses to both the Workshop Evaluation and the Post-Class Survey, it is evident that, from the student’s perspective, the course was effective at meeting its objectives of advancing their general knowledge of architecture as well as their experiences in professional practice environments. The average of the
mean for questions one through seven in the post-class survey (4.26 on a 5 point scale) and on the Workshop Evaluation (4.67 on a 5 point scale) indicate a favorable assessment of the course. Additionally, when considering the mean for questions four through seven (4.04 on a 5-point scale), which specifically addressed their perceptions relative to their prior co-op experiences, the responses indicate that the course was perceived as providing comparable benefits as with conventional cooperative education requirements. This is reinforced by the statistically significance of the mean of the responses relative to a neutral assumption of 3. Surprisingly, there were no significant correlations between the perceived effectiveness of the work experience and the use of the class to meet a co-op requirement, as one would assume there would be a tendency to rate the course higher in this area among students intending to do so would be somewhat higher.

Responses to the open-ended questions proved to be useful in providing additional insight. While one student’s comment that “the experiences were comparable to my previous co-op; I learned about the same amount in both experiences” was somewhat reserved and tempered, others were more positive. Positive comments included statements that included “the knowledge I gained related to my professional field more than previous co-ops because I was able to see the profession from a different point of view.” Another student stated that “having never done a co-op in an architectural office, my time there during the trip will pay off in the future.”

Four students identified the office experience component of the course as one of the two best activities. One stated that “the week field experience helped me understand how [an] architectural firm works in London” and another commented that “being able to work in the UK was a great experience….I was able to speak to and work with the professionals and learn as much as they could teach,” and added that “it made the experience seem more of an apprenticeship, being able to learn by doing.” Another student directly addressed applied knowledge gained from the work experience, stating that “I was able to see how things are completed in a firm in a different country and in turn learned more about codes and ordinances in our country.”

Students also commented on the uniqueness of the work experience and the opportunity to be exposed to practice in the UK. One student commented that “although at my work experience I didn’t learn any new techniques on the computer … I learned a lot about how they build in London,” adding “it was neat to see how they build and how environmentally friendly they are.” A student who rated the experience as “about the same” stated that “the knowledge I gained related to my professional field of architecture was more than previous co-ops because I was able to see the profession from a different point of view… whereas my previous co-ops were spent behind a computer or desk, in London I spent each day of the week at a different job site, and saw things as they were built, not just on paper.” In contrast, another student who had rated the knowledge gained from the office experience as “about the same as previous co-ops” identified the work experience as one of the two components that contributed the least. Another commented on the length of the work experience and stated that they “felt the work experience was very helpful but needed to be longer.” However, the same student added “I also feel that I learned a great deal about urbanism from a different perspective.”

Many comments were directed toward benefits of the class in more general career and academic terms. The comments included the following:
• [I] gained [knowledge of] the architectural styles of London, which helped out in the history of architecture
• The experience of international perspective in architecture is important in order to have a well diversified understanding of architecture
• I now have the ability to apply different ideas, ideas I have never thought of. I understand I must further my education in the field of architecture
• I learned so much more than I can actually apply to both work and school
• I learned a lot and I saw so many styles that I would not have gotten the chance to see if not given the opportunity to go to London
• I think that seeing as many buildings as we did and the caliber of them will definitely affect how I view architecture from now on – we all wished we had taken this trip before junior studio
• Just being able to experience such an architecturally rich area expanded what I thought about building in general
• I have gained better knowledge of architectural history by experiencing it first hand than in class
• The cultural experience of a European country was well worth the time and cost… the architecture in the London area was amazing to see up close.
• I still feel inspired to learn and continue the profession, although more so on possibly the international level

The firms that hosted students were also asked to provide feedback regarding their interactions with the students, the length of the work experience, and the preparedness of the students. While there were many very favorable comments regarding the students abilities it was clear that the participating firms would have preferred a longer work experience. However, the statements were typically qualified in terms of the firm’s understanding of the course context. For example, the managing architect at one firm stated that the student placed at their office “was very talented, but by the time we found out he was gone, so it would have been helpful for the firm if he had stayed longer.” She also stated that, although she felt the work experience was short, that “students may get some benefit of getting a sense of what it is like to be working in UK.” One firm’s principal stated that the length was “appropriate for the student though limited from our point of view,” but also added that “we greatly enjoyed having your student with us; he made a significant contribution even in the short time he was with us.”

However, representatives from other firms that stated that the experience was short also indicated that they perceived their role in the process as something other than providing a work opportunity:

“We participate to offer something to a student. We don't focus our efforts on putting someone into production but rather offer a spread of experience such as site visits with different team leaders etc and on that basis a week is just about the right length.”

Similarly, another architect commented on the benefits of a longer work-period to the student rather than just to the firm, but also commented on the duration assigned to the other activities of course as well:
“There would have been some benefits of extending the period from 1 week to two - eg. student being able to become more confident and comfortable with others in the office; student being able to carry out work in more detail and so being more useful as well as getting more experience. However condensing everything into 1 week focuses everyone's attention and if the student's visit is for, say 3 weeks, then the other two weeks would be best spent traveling and exploring others areas in the UK and Europe, in my opinion.”

He summarized with the following statement:

“I thought the whole exercise was a great success and would be delighted to participate if required next year.”

Conclusions

The survey data and associated statistical analysis indicate that the students felt that the work experience component of the class was a viable alternative to the traditional cooperative education course option. This is clearly indicated by the statistical significance of the positive ratings for the course related to topics such as increased understanding of professional practice, increased practical knowledge from work assignment, as well as the ratings for the course in terms of applicability of knowledge to the student’s professional as well as academic future. The responses from the participating firms also suggested a positive perception of the work-experience course activities. The responses support the conclusion that the course was successful in providing a professional experience that, particularly from the student perspective, paralleled the outcomes of the conventional cooperative education requirement. More importantly, the responses also indicated that the class met the objectives of promoting students’ intellectual development in terms of their understanding of the broader global context of contemporary architectural practice.

As noted in the instructor observations, shortcoming related to the students familiarity with the metric system and metric-based CAD operations suggest revisions to the content of the pre-trip preparation. Faculty considering similar course offerings that involve integrated work experiences at locations where the metric system is used should incorporate preparation on the use of the metric system in general measurement as well as in CAD operations. This would include the use of metric-based CAD templates and dimensioning standards. In addition to these changes, the comments from the firms have resulted in an expansion of the work experience to include an additional three half-day work sessions for the summer 2006 offering.

References


Figure 1. Presentation Board Example

ARCH 450. ARCHITECTURAL FIELD EXPERIENCE IN THE UNITED KINGDOM

INIGO JONES

He was born in London in 1573. A royal protégé, he was appointed Surveyor to the Queen in 1615. In 1618 he was appointed Surveyor of the King's Works. In 1625 he began work on the Queen's House, Greenwich. In 1638 he built the royal Banqueting House in Whitehall. He also made designs for St. Paul's Cathedral, Covent Garden, and the Savoy. Although Jones was a master craftsman, he was also an important figure in architecture because he was the first person to introduce the classical architecture of Rome and the Italian Renaissance to Great Britain.
Appendix 1. Office Experience Report

Practicum and Field Report: Arch 490 Architecture Experience in the United Kingdom

Drawing on the discussions in the pre-trip sessions, you are to respond to the following questions. Unless otherwise noted, each response is to be a minimum of two pages (double spaced, 1” margins left/right/top/bottom, 12 points times new roman font). Include only the number and a single line heading on the first line of the pages for each question. You are to include a title page with the report title (Practicum and Field Report: Arch490 Architecture Experience in the United Kingdom), your name, and date.

Questions:
1. From the perspective of the architects you worked with, describe the history of zoning ordinances in the UK, and specifically in relationship to the borough in which you had your field experience.
2. Describe the building code standards that govern architectural practice in the UK.
3. Building codes in the US utilize the concept of Construction Types to determine the safety standards that apply to a buildings use and construction materials. Describe what you have learned about UK building codes and general similarity and differences from codes in general in the United States. (You can utilize OBBC table 401 as a reference).
4. Document the organizational structure of the firm in which you had your field experience (use a flow chart). Based on your field experience interviews, identify the perspectives of the firm’s primary personnel on architectural education relative to preparation for professional practice in the UK.
5. Document the educational and work experience of the employees at your field experience firm (at large firms you may limit this to the principles).
6. Describe the client base the firm in which you had your field experience. Include a break down of client type (e.g.: commercial, residential, educational, etc.). Include sub-categories where applicable (for example, break down commercial into retail, office buildings, etc.).
7. What are the primary marketing strategies employed by the firm at which you had your field experience?
8. Document (graphically and with text) the graphic conventions utilized in the firm in which you had your field experience. This must include (but is not limited to):
   - Sheet numbering conventions
   - Drawing titles
   - Annotation standards
9. Document the specification standards in use in the UK (and at the firm in which you had your field experience).
10. Digital technology in practice in the UK
    a. Describe in detail the role of digital technology in the firm in which you had your field experience? Include CAD, modeling and animation, the role of the internet and WWW, and web-based project management.
    b. Based on your experience as well as that of the other students in the course, develop a position paper (2 pages minimum) that describes the role of digital media in architectural practice in the UK in general. (Assume you are writing to explain the similarities and differences to practice in the United States)