# Development of a Blended Learning course – BIO129

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## Introduction

Bio129: Human Anatomy, serves as a general education course and is a required course for certain majors at Penn State Berks campus as well as students who intend to pursue careers in many clinical and health related professions. Course offerings for Fall semesters typically encompass large lecture classes as well as a laboratory component where students are broken down into groups of approximately 24 to maintain the appropriate seating requirements for the laboratory setting. Comprehension and retention of the quantity of course material that is required, given the number of students in the lecture setting, can be challenging. In courses like anatomy and physiology a better conceptual understanding of course materials and the ability to translate content into critical thinking and problem solving situations is crucial to the transition from academic to clinical settings.

The ability of students to assess their learning in real time and to improve their time management skills, as they relate to knowledge retention, is imperative. The acquisition of content knowledge on a regular basis throughout the semester, rather than in the week immediately preceding an examination, is a critical component to success in such a labor-intensive course. An instructor interest in multimedia instructional elements was present however instructor knowledge in this area was limited. The transition from a semester project which was presented in class to a semester project which incorporated a multimedia instructional element was desired. Objectives for the project remained the promotion of discovery-based learning and the fostering of critical thinking and independent research skills, during the presentation of a pathologic condition, selected by the student, which was associated with content knowledge the student had obtained during the semester.

Another concern which had manifest in previous semesters was possible incongruity and inconsistency between differing sections of laboratory instruction. Since there was no consistent format or template already established for the laboratory instructors, a degree of inconsistency was to be expected. Students in differing sections, however, deemed these differences to have an impact on their laboratory grades and thus their overall success in the course as a whole. Whether or not this assessment was accurate was immaterial, as the student’s perception impacted their expectations and therefore their outcomes.

Project learning outcomes for the course included the following: the identification of anatomical features given an image of those features as well as on a model where clay was used to reconstruct the features, the ability to identify a muscle and state the origin, insertion, and action of said muscle, to describe relevant clinical information pertaining to anatomical features studied, to research pathologic conditions associated with acquired content knowledge using resources appropriate to the level of education, and to properly identify anatomical features in a cadaver simulated program where depth and relation of associated structures is appropriately represented.

With this in mind, objectives for implementation of a blended course format included the following: increasing time on task outside of the classroom setting, movement towards a more student centered approach to enhance development of cognitive strategies important in a clinical setting, the transition to face-to-face time being focus around higher-level learning, creation of a laboratory template to maintain consistency between different laboratory sections, improvement in retention by incorporating multisensory as well as multimedia instructional elements. By affording the students 24/7 access to course content and requiring basic course knowledge prior to face-to-face sessions, both face-to-face and laboratory time was significantly reduced while retention and academic performance were improved.

Introduction of a computer-based technology which offered simulated cadaver dissection in place of a traditional textbook was implemented to afford the ability to identify anatomical structures in a more visually stimulating and accurate format which allows for the depiction of appropriate depth and relation of associated structures. The program selected was Anatomy and Physiology Revealed 3.0, from McGraw-Hill, which also proved to be a more affordable alternative to traditional textbooks. The utilization of this technology also supported other course goals including movement towards a multisensory approach in the acquisition of knowledge, and real-time assessment as the program allows students to self quiz on content that has been customized for this course.

A series of weekly web-based assessments were integrated into the course utilizing the Angel course management system. While the quizzes within Anatomy and Physiology Revealed 3.0 were self assessments that students could utilize at their leisure to improve their comprehension, Angel assessments are used as part of the course grading scheme to increase time on task outside of the classroom and facilitate consistent exposure to content. To maintain consistency of expectations throughout the semester, all Angel quizzes were due at the same time and day every week.

Power points were provided to students with weekly face-to-face lecture material and it was strongly suggested to students that they review this material prior to coming to class each week. Because they were introduced to the basic content knowledge prior to face-to-face meetings, instruction in the classroom was more geared towards tips and tricks to help students remember basic course content, as well as the clinical application of the content to foster analytical and critical thinking skills. This also served to reduce face to face time and allow for more time on task outside of the classroom.

## Project Design

Because the initial application for TLI Grant to accomplish the above goals was unsuccessful, the instructor partially implemented suggested corrective measures, to the degree possible, prior to full implementation of the collaborative model approach. Upon implementation of project design with the interdisciplinary team which consisted of the Director of the Center for Learning and Teaching, Instructional Design, Multimedia and Instructional Technology Specialists, and the Faculty Member, all steps were integrated to ensure that project goals were met within the guidelines of the Penn State Quality Assurance Standards.

An initial meeting between the director of CLT, the Instructional Designer, the Multimedia Specialist, the Instructional Technologist, and the Faculty Member was utilized to establish a plan for each individual's role in the project as well as to establish a joint understanding of project goals, course goals, and learning outcomes.

The first phase of the creation of a hybrid course included a course syllabus and outline as the first deliverable. The outline included learning objectives for each module of the course as well as associated content in the form of power points and weekly module quizzes. The syllabus and outline were developed with significant input from the Instructional Designer as well as other members of the interdisciplinary team.

The second deliverable provided more detailed information about specific learning activities. Consultation with the Multimedia Specialist was an integral part of designing a semester project that included the use of Media Commons so that presentations could be offered in a video format on YouTube rather than the traditional in class presentation. The Multimedia Specialist was able to develop specific grading rubrics to direct students in all aspects of their video presentation as well as a post presentation interactive game, presented in the classroom, to foster content knowledge of their given topic. Keeping a semester long “score” for all of the groups of students in the course kept the students more engaged in the process throughout the semester. At the end of the semester the group that had tallied the most points in the post presentation games was awarded a special prize. This also assisted the students in working together as a group toward a final goal. Additionally, critical to this stage was development by the Instructional Designer of weekly lecture and laboratory schedules. This has been invaluable in minimizing student questions and keeping the students on task on a weekly basis.

The third step in project design included the migration of online content and activities onto the Angel platform. When the course was copied from the Fall 2012 semester to the Spring 2013 semester there was unfortunately a significant loss of course materials in the form of visual content. The Instructional Technologist, Instructional designer, and CLT interns were invaluable in rectifying this situation.

At the end of the Fall 2012 semester the Instructional Designer developed an End of Semester Survey Instrument for students in order to receive qualitative results on their experience with the hybrid course.

## Learning Outcomes & Discussion

Students were surveyed at the end of the semester on a variety of topics with 76.1% of the respondents indicated that this was their first experience to hybrid learning. Focusing attention on the hybrid-format questions, Tables 1, 2, and 3 summarize the responses obtained.

Table Student satisfaction with online and technology-based content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Response | Face-to-Face classes (in general) are valuable. | Required modules within APR are valuable. | Weekly ANGEL module quizzes are valuable. | Lab module schedules within ANGEL are valuable. | Weekly lab guides are valuable. |
| Strongly Agree | 43.5% | 58.7% | 63% | 60.9% | 60.9% |
| Agree | 47.8% | 34.8% | 32. 6% | 39.1% | 39.1% |
| Neutral | 6.5% | 4.3% | 0% | 0% | 0% |
| Disagree | 2.2% | 2.2% | 4.3% | 0% | 0% |
| Strongly Disagree | 0% | 0% | 0% | 0% | 0% |
| Not Applicable | 0% | 0% | 0% | 0% | 0% |

As indicated in Table 1, an overwhelming majority of students rated the online aspects of the course favorably including 93.5% of students for the required APR modules and 95.6% of students for the ANGEL module quizzes. In addition, 100% of students found that the online lab module schedules and weekly lab guides were valuable.

Table Student Perceptions of active learning in the hybrid format

|  |  |
| --- | --- |
| Response | This course requires students to be active participants in the teaching and learning process. |
| Always | 37% |
| Very Often | 37% |
| Often | 19.6% |
| Occasionally | 6.5% |
| Rarely or never | 0% |

As indicated in Table 2, 94.5% of the students indicated that active learning occurred Always, Very Often, or Often in the course.

Table Media Commons Project

|  |  |
| --- | --- |
| Response | The process of researching, planning, and producing a video with my group was a worthwhile learning experience and increased my understanding of our topic. |
| Strongly Agree | 17.4% |
| Agree | 45.7% |
| Neutral | 21.7% |
| Disagree | 10.9% |
| Strongly Disagree | 2.2% |
| Not Applicable | 0% |

As indicated in Table 3, 63.1% of the students Strongly Agreed or Agreed that the Media Commons Project was a worthwhile learning experienced and increased their understanding of their chosen topic.

Students also had an opportunity to answer open ended questions that focused on how to improve the course and what they found most effective and/or satisfying. From these results, the vast majority of the students enjoyed the hybrid format and one student expressed “I loved the way the course was; I hope you don’t change it.” In addition, the most mentioned aspect was how the APR dissection tool helped them learn, study, and retain the information. One student felt that the way the hybrid course was structured with APR “once you learn the information, you’ll never forget it” which is essential given the future careers the students are pursuing.

After the conclusion of Fall 2012, withdrawal rates and final grade outcomes were reviewed thoroughly. Comparison was made between the four semesters in which the blended format was partially or totally implemented, and the four semesters prior to soft implementation. As indicated in table 4 (below), when comparison is made between the four semesters prior to partial implementation of the blended format and the four semesters since partial implementation, average withdrawal rates decreased from 16.9% to 6.1%. Even when adjusting for the Summer 2012 session which demonstrated a zero withdrawal rate, most likely due to low enrollment numbers, the average withdrawal rate still decreased to 8.2% which is approximately half of that for the previous four semesters. When comparison is made between the number of students who achieved a grade of C or better for the course between the Fall 2008 semester and the Fall 2012 semester, there is an increase from 77% to 91%.

Table Withdrawal Rates and Grade Comparisons

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Semester | Number  Of students | A’s | B’s | C’s | D’s | F’s | % Withdrew |
| Fall 2008 | 74 | 22% | 23% | 32% | 19% | 5% | 23 |
| Fall 2009 | 87 | 24% | 24% | 27% | 11% | 15% | 13.8 |
| Fall 2010 | 73 | 23% | 23% | 21% | 18% | 15% | 16.4 |
| Summer 2011 | 14 | 50% | 33% | 17% | 0 | 0 | 14.3 |
| Fall 2011\* | 70 | 29% | 37% | 24% | 3% | 6% | 11.4 |
| Spring 2012\* | 22 | 57% | 14% | 5% | 10% | 14% | 4.5 |
| Summer 2012\* | 4 | 100% | 0 | 0 | 0 | 0 | 0 |
| Fall 2012 | 70 | 41% | 33% | 17% | 6% | 3% | 8.6 |

*Semesters which represent partial implementation are represented with an asterisk and full implementation is underlined.*

## Scholarly Outcomes

There are currently no publications or presentations that resulted from this project.

## Recommendations

Specific recommendations for others who might consider implementing a similar approach for an entry level anatomy course would be as follows:

1. Students should be advised early in the process, ideally during advising and scheduling meetings, that blended courses require a great deal of self motivation and that course expectations require them to stay current with course materials and grades without continued prompting.
2. In keeping with recommendation number one, it is also pertinent to inform students that they will have significantly more autonomy in this style of course so that those who are self-motivated can take advantage of anticipating the freedom which is fostered in a blended format.
3. 3. Face to face meetings should focus on tips and tricks to foster long term retention of the information as well as higher-level learning and clinical associations that make the material relevant.
4. 4. Instructors should bear in mind the labor intensive nature of design and development of a blended format.

## Conclusion

Implementation of a hybrid learning format for Bio 129, Human Anatomy, has enabled a reduction in face-to-face and laboratory time while fostering better independent study skills and time on task outside of the classroom. Withdrawal rates from the course as well as final grade outcomes have been significantly improved with the implementation of this format. Student evaluations indicate that students perceive themselves to be active participants in the learning process and have a positive perception of online course components, including Angel quizzes, in this format. The shift to a blended course style has also allowed face-to-face time to be more heavily weighted towards content retention and clinical associations, with less time being dedicated in the classroom to lower-level learning.

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