**Development of a Blended Learning course – BIO141**

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**Design: Spring 2014**

**Implementation: Summer 2014**

**Introduction**

Bio141: Human Physiology, 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 Spring semesters typically encompass large lecture classes with enrollments of approximately 80 students per section. Fall semester classes are somewhat smaller with approximately 50 students enrolled. In a course such as this, not only is comprehension and retention of basic knowledge required but a more in depth understanding of physiology is necessary if a student is to become competent to think critically and problem solve in a clinical setting. Given the number of students in the lecture setting this can be challenging. As more class time is utilized reinforcing basic concepts, in class time that could more effectively be directed towards analysis and problem solving at a higher level of complexity is reduced. In courses like anatomy and physiology a better conceptual understanding of course material and the ability to translate content into critical thinking and problem solving is crucial to the transition from academic to clinical settings.

The ability of students to assess their learning of basic nomenclature and concepts in real time and to improve their time management skills, as they relate to knowledge retention, is imperative. Also of primary concern is the ability of the student to access lecture material at a time that is convenient to them, as well as at a frequency that meets their needs. 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 courses. Objectives for the project were to foster a strong command of basic physiologic concepts, to promote critical thinking and independent study/time management skills, and to improve course grades and retention.

With basic concept lectures being presented prior to the students arrival in class, face to face time can be better utilized on higher level processing including analysis, critical thinking, application of concepts, and problem solving. One concern was maintaining consistency between differing sections of instruction. With a significant component of the lectures being presented in an online format, students in different sections will be offered consistent course experiences thereby limiting any possible perception on the student’s behalf that variations in sections could impact their outcomes.

With this in mind, further 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 of face-to-face time focusing on higher-level learning, the creation of an online template to maintain consistency between different lecture sections, and improvement in retention and grades by incorporating multimedia instructional elements. By affording the students 24/7 access to course content and requiring basic course knowledge prior to face-to-face sessions, face-to-face time was significantly reduced while retention and academic performance were improved.

A series of weekly web-based Pre-Module assessments were integrated into the course utilizing the Angel course management system to allow real-time assessment of basic course concepts and nomenclature prior to face to face meetings. Angel assessments were 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 of weekly content were provided to students which included detailed lecture notes so that all students were able to focus on their auditory acquisition skills, regardless of any disabilities that may be present which would challenge or impede the ability to take effective notes while listening to lectures. Students were instructed to review this material and complete the Module pre-quiz which was based on the power point/lecture notes, prior to viewing the online lecture each week. Following completion of the pre-quiz, students were directed to view the online lectures and answer questions of varying difficulty which were embedded in the power point/lecture notes. Instructions were that the student should answer, to the best of their ability, prior to class meetings. Because they were introduced to the content knowledge prior to face-to-face meetings, instruction in the classroom was geared towards developing a thorough understanding of answers to embedded questions, tips and tricks to assist students in retention of basic course content, and 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**

During the first semester that online lectures were offered there was only partial implementation of the new material as full implementation required the skills of an interdisciplinary team to allow for a more student friendly visual approach. 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, 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. Additionally, critical to this stage was development by the Instructional Designer of weekly lecture schedules. This has been invaluable in minimizing student questions and keeping the students on task on a weekly basis.

During the Summer 2014 semester the Instructional Designer developed an End of Semester Student Survey Instrument 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 53.3% of the respondents indicating 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 1. Student satisfaction with online and technology-based content.*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Response | Face-to-Face classes (in general) are valuable. | Module schedules within ANGEL are valuable | Weekly ANGEL module quizzes are valuable. | Recorded mini-lectures are valuable. | Module learning goals are valuable. |
| Strongly Agree | 73.3% | 73.3% | 60% | 46.7% | 66.7% |
| Agree | 26.7% | 26.7% | 33.3% | 33.3% | 13.3% |
| Neutral | 0% | 0% | 6.7% | 6.7% | 20% |
| Disagree | 0% | 0% | 0% | 13.3% | 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 100% of students for the Module Schedules and 80% of students for the Module Learning Goals and Recorded Mini-Lectures.

*Table 2. 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 | 60% |
| Very Often | 26.7% |
| Often | 13.3% |
| Occasionally | 0% |
| Rarely or never | 0% |

As indicated in Table 2, 100% of the students indicated that active learning occurred Always, Very Often, or Often in the course.

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 really enjoyed how well prepared the lessons were. Having the full module schedule online helped a lot, and so did the connections that were used to put the learning material into a different perspective.” In addition, the most mentioned aspect was flipping the classroom by having mini-lectures before class which allowed more in-class time for critical thinking questions. Two comments related to this are “The mini-lectures are helpful and really make me go over each powerpoint. Also, the questions within the powerpoint really make me understand the material” and “I really like group discussions + how the professor gives us critical thinking questions that apply to clinical aspects”.

After the conclusion of Summer 2014, withdrawal rates and final grade outcomes were reviewed thoroughly. Comparison was made between the semesters in which the blended format was partially or totally implemented, and the four semesters prior to 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 7.373% to 5.495%. When adjusting for the Summer 2012 session which demonstrated a zero withdrawal rate, most likely due to low enrollment numbers, the average withdrawal rate decreased from 8.602% to 5.495. When comparison is made between the number of students who achieved a grade of C or better for the course sections between the Fall 2011 semester and the Summer 2014 semester, two of the top three highest achieving are Spring 2014 with 85.13% and Summer of 2014 with 94.45%. The only non-hybrid section in the top three is Summer 2013 with 95%. Other course sections are significantly lower including Fall 2013 with 68.42%.

*Table 4. Withdrawal Rates and Grade Comparisons. Semester that represents partial implementation is represented with an asterisk and the semester that represents full implementation is underlined.*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Semester** | **Number****Of students** | **A’s** | **B’s** | **C’s** | **D’s** | **F’s** | **% Withdrew** |
| **Fall 2011** | **40** | **12.5%** | **25%** | **45%** | **7.5%** | **10%** | **6.98%** |
| **Spring 2012** | **145** | **22.07%** | **28.28%** | **33.10%** | **10.34%** | **6.21%** | **7.64%** |
| **Summer 2012** | **10** | **70%** | **1%** | **1%** | **1%** | **0%** | **0%** |
| **Fall 2012** | **38** | **10.53%** | **36.84%** | **26.32%** | **18.42%** | **7.89%** | **11.63%** |
| **Spring 2013** | **138** | **20.29%** | **34.78%** | **24.64%** | **13.04%** | **7.25%** | **9.8%** |
| **Summer 2013** | **20** | **45%** | **30%** | **20%** | **5%** | **0%** | **0%** |
| **Fall 2013** | **38** | **15.79%** | **23.68%** | **28.95%** | **13.16%** | **18.42%** | **15.56%** |
| **Spring 2014\*** | **148** | **17.57%** | **38.51%** | **29.05%** | **8.11%** | **6.76%** | **5.73%** |
| **Summer 2014** | **18** | **61.11%** | **27.78%** | **5.56%** | **5.56%** | **0%** | **5.26%** |

**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 physiology 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. Face to face meetings should focus on tips to foster long term retention of the information as well as higher-level learning and clinical associations that make the material relevant.

 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 141, Human Physiology, has enabled a reduction in face-to-face 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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