Assessing Conventional, Hybrid & Distance Learning Courses in Horticulture

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Abstract

Educational objectives for the course "Organic Farming and Gardening" compared yearly cohorts of student enrollment, academic grades, knowledge gain, instructor performance, and student satisfaction to examine instructional effectiveness of a learning management system (eCollege; Pearson eCollege, Denver, CO). Conventional class formats had 114 undergraduate students registered from years 2007 to 2009. Due to high demand and insufficient classroom space, this conventional curriculum was reformatted with identical course content into both a hybrid and a fully online version in which 361 students registered from years 2010 to 2012 and 336 students from 2013 to 2015. In comparing conventional instruction with hybrid and fully online versions over a 9-year period, few significant differences were found in final grades involving 811 students. Over their 6-year span, the conventional class average of 89.6% was slightly higher compared with 88.3% for the hybrid format and 86.8% for the online format. Student evaluation surveys assessed faculty performance with eight evaluative questions on a 1 to 5 scale. No significant differences existed between teaching effectiveness in person vs. remotely, averaging 4.35 for the hybrid and 4.17 for the online. There were no significant differences in comparing educational methodology, technology, student confidence, and class satisfaction. Student responses indicated a significant preference overall for hybrid and online course formats compared with conventional methods. Registration numbers indicated an overwhelming choice for online education with an average class enrollment of 91.0 students compared with 38.0 students for conventional classes and 25.2 students for the hybrid format.

Introduction

An important institutional issue at many large public and private universities is lack of classroom space. Current challenges with distance education are to create courses in a minimum amount of time, expense, and technical skill, yet produce an educationally sound curriculum. Our study goals were to assess methodologies in regards to instructor performance, student learning outcomes and incorporate new online technology.

Objectives

Our educational objectives for the course comparisons of "Organic Farming and Gardening" were to compare annual student enrollment and grades for the hybrid, online and conventional formats and to evaluate instructor performance via student feedback..

Material & Methods

The experimental design analyzed academic grades, measured knowledge gain, evaluated instructor performance and surveyed student satisfaction. Such comparative information would help examination of instructional effectiveness of a learning management system. The LMS (eCollege digital technology, Pearson eCollege Headquarters, Denver, CO) is part of the Pearson Learning Studio and learning management system that is a comprehensive, on-demand, online learning solution available for the delivery of fully online, hybrid, and face-to-face courses.

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Results

In a conventional sophomore level course entitled "Organic Farming and Gardening," 114 undergraduate students registered from years 2007-09. Due to high demand and insufficient classroom space, this conventional curriculum was reformatted with identical course content into both a hybrid and a fully online version in which 361 students registered from years 2010-12 and 336 students from 2013-15. In comparing conventional instruction with hybrid and fully online versions over a nine-year period, few significant differences were found in final grades involving 811 students (Table 1 & 2). Final class grade averages of these three learning systems ranged from 85.5 to 89.6 over their first three-year spans. Over their six-year span, the conventional class average of 89.6 was higher compared to 88.3 for the hybrid format and 86.8 for the online format. Student evaluation surveys assessed faculty performance with eight evaluative questions on a 1 to 5 scale from years 2012-14. No significant difference existed between teaching in person versus remotely, averaging 4.35 for the hybrid and 4.17 for the online. An additional eight questions measured educational methodology, technology, student confidence and class satisfaction. There were no significant differences in comparing the combined averages of 4.12 for the hybrid format and 4.00 for the online version (Table 3).

Fig. 1. Student view of video lesson and Qumu control in eCollege learning management system with dual-framed view of presenter and PowerPoint to the online classes on demand

Student	Current events (%)	Organic design (%)	Exam one (%)	Exam two (%)	Extra credit	Final project (%)	General participation (%)	Trip report (%)	Weighted average %
A	94	90	92	89	*	78	72	92	82.9
B	95	95	94	82	*	93	72	92	85.9
C	93	92	89	83	*	95	100	94	94.0
D	86	94	93	88	*	95	70	95	85.6
E	94	95	83	79	*	94	92	94	90.9
F	90	92	74	63	*	95	88	98	87.1
G	93	87	94	85	*	88	94	93	91.0
H	95	94	96	83	*	98	96	94	94.6

Table 1. Gradebook categories and eCollege calculations. Eight grading categories are automatically calculated with individual weighting per category allowing students to remotely view their current status.

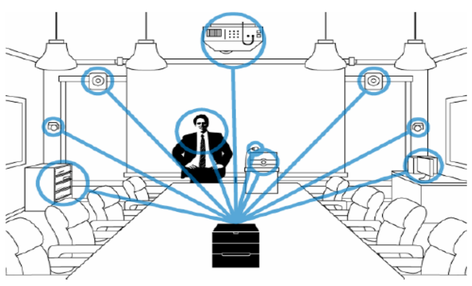
Instructor and class ratings

Class format	Instructor prepared and organized	Effective response	Generate interest	Positive attitude & assistance	Instructional methods encouraged student learning	Teaching effectiveness	Overall class quality	Met objectives in the syllabus
Hybrid	4.38	4.32	4.32	4.36	4.30	4.50	4.34	4.54
Online	4.16	4.20	4.34	4.25	4.09	4.18	4.14	4.22
*P*value[z]	0.585	0.799	0.97	0.783	0.535	0.310	0.488	0.393

Student impressions ratings

	Assigned grades fairly	I learned a great deal	I had a strong prior interest	Good balance readings, assignments	Comfort using online system	Technical support	Online environment effectiveness	Recommend course to others
Hybrid	4.20	4.07	3.87	4.29	4.07	3.82	4.35	4.30
Online	4.12	4.12	3.74	4.14	3.93	3.81	4.12	4.01
P-value	0.569	0.855	0.656	0.571	0.153	0.796	0.297	0.186

Table 3. Mean student instructional ratings for thel class "Organic Farming and Gardening" averaged over years 2012, 2013 and 2014 at Rutgers University by class format. Each response is on a scale of 1 to 5 where 1= strongly disagree and 5= strongly agree.



PI Sciarappa at RU-SEBS Bioenergy

QUMU capture system setup

Registration Results

Year	Class format	Students enrolled	Average grade[z]	Std. dev. of grade
2007	Conventional	31	91.0	5.9
2008	Conventional	39	93.4	2.8
2009	Conventional	44	88.2	10.6
2010	Hybrid	32	90.6 a	4.3
	Online	69	84.0 a	13.0
2011	Hybrid	27	82.0 a	14.4
	Online	103	89.3 b	9.0
2012	Hybrid	35	86.6 a	11.5
	Online	98	86.4 a	10.7
2013	Hybrid	24	88.5 a	7.6
	Online	101	85.5 a	11.4
2014	Hybrid	17	89.7 a	12.9
	Online	77	84.9 a	11.2
2015	Hybrid	16	89.3 a	8.2
	Online	101	88.1 a	12.3

Table 2. Mean grades within a year with different letters are significantly different at α=0.05 by ANOVA.

Comments

We believe that all three formats can exist concurrently and effectively extend the educational reach. Faculty and administrators may also prefer the totally online system in recycling quality presentations digitally, saving travel time, reducing transport expenses, minimizing classroom space and increasing tuition dollars. We conclude that sophomore to senior students can benefit with a wider choice of both hybrid and totally online classes that provide independent study projects emphasizing student centered, faculty guided instruction. The quantifiable data found in this study supports the quality, effectiveness, and utility of these distance education methods.

Conclusion

Knowledge gain over the semester was similar in all three formats. Student responses indicated a significant preference overall for hybrid and online course formats compared to conventional methods. Registration numbers indicated an overwhelming choice for online education with an average class enrollment of 91.0 compared to 38.0 in conventional classes and 25.2 for the hybrid format.