A FACULTY ASSESSMENT OF THE ACADEMIC RIGOR OF ON-AND OFF-CAMPUS COURSES IN AGRICULTURE

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Abstract

The purpose of this study was to compare college of agriculture teachingfaculty members 'perceptions of the academic rigor of on-campus and off-campus courses. The population included 262 faculty members with teaching responsibilities or with teaching experience in the College of Agriculture at Iowa State University. All members of the population were surveyed and the response rate was 54.2%. Exploratory factor analysis was used to identify factors underlying college of agriculture teaching faculty members , perceptions of the academic rigor of on-campus and off-campus courses. Ultimately, three factors were identified including (I) active learning, (2) effort, and (3) high cognitive levels. The factors were useful in explaining academic rigor in on-campus and off-campus courses. College of agriculture teaching faculty perceived off-campus courses to be less rigorous than on-campus courses. Notably, faculty perceptions of the academic rigor of on- and off-campus courses were independent of their participation in faculty development programs related to distance education and their experience with distance teaching. Further research is needed to determine if off-campus courses do infactprovide less opportunityfor active learning, require students to expend less effort, and result in lower level cognitive outcomes.

Introduction

Academic rigor is a popular topic of discussion among the stakeholders in education. Despite its popularity, there is a paucity of research and scholarship on the topic. What is academic rigor? Braxton (1993) characterized rigor as the demands that course processes make on students to demonstrate higher cognitive levels of achievement as defined by Bloom's (1969) taxonomy of educational objectives. Unks (1979) asserted that rigor in its best sense means challenging each student toward individual excellence. Rigor "is a careful, continual self-motivated action towards excellence in thinking, feeling, choosing, evaluating, relating to others, learning to learn and becoming one's own best teacher" (p. 158). Accordingly, a rigorous course gives students the opportunities to reach the higher levels of cognitive learning, achieve academic excellence, and actively participate in the learning process.

Bloom (1969) developed a hierarchy of cognitive learning that includes the following levels: (1) knowledge, (2) comprehension, (3) application, (4) analysis, (5) synthesis, and (6) evaluation. Higher levels of cognitive learning are associated with a deeper understanding of concepts. Teaching to higher cognitive levels can challenge students to reach the extent of their own abilities while participating in the thorough, logical and scientific process of solving real problems (Unks, 1979).

Students develop deeper understandings when they are actively seeking solutions for themselves (Purkiss, 1995; Newcomb, McCracken, and Warmbrod, 1993). Active learning is a key component of constructivist learning theory. Constructivism explains learning as a process in which students interact with the physical and social environments (Fosnot, 1996; Taylor, 1996). Based on Piaget's biological model and Vygotsky's

emphasis on the sociohistorical aspect of knowledge, the theory of constructivism regards learning as an active process in which students themselves have to construct meaning. Students should be challenged to create their own ideas in dealing with the intellectual problems presented to them (Gruender, 1996).

Taylor (1996) further explained constructivist learning theory as a developmental process by which students improve from a lesser to a more perfect understanding. Thus, the responsibility of teachers is to provide students with active learning opportunities in exploring patterns, raising their own questions, and building their own models. In essence, autonomy, independence, and empowerment become the goals (Keegan, 1986; Fosnot, 1996).

How do off-campus courses compare with on-campus courses with regard to academic rigor? Do off-campus courses challenge students to reach higher levels of cognitive learning, achieve academic excellence, and actively participate in the learning process? Off-campus courses are viewed by many in academe as a second best alternative to on-campus courses (Wilson, 1991). According to Dillon and Walsh (1992), faculty resistance is often listed as the major barrier keeping distance education technologies from being implemented. What factors are important for explaining faculty perceptions of academic rigor? Do college of agriculture faculty perceive off-campus agriculture courses to be as rigorous as on-campus courses?

Purpose and Objectives

The purpose of this study was to compare college of agriculture teaching faculty members' perceptions of the academic rigor of on-campus and off-campus courses. The objectives of the study were as follows:

1. Identify factors underlying college of agriculture teaching faculty members' perceptions of the academic rigor of on-campus and off-campus courses
2. Describe the association between college of agriculture teaching faculty members' perceptions of the academic rigor of on-campus and off-campus courses and their participation in faculty development opportunities related to distance education.
3. Describe the association between college of agriculture teaching faculty members' perceptions of the academic rigor of on-campus and off-campus courses and their off-campus teaching experience.
4. Compare college of agriculture teaching faculty members' perceptions of the academic rigor of on-campus and off-campus courses.

Procedures

The population for this study included faculty members with teaching responsibilities or with teaching experience in the College of Agriculture at Iowa State University. The list of the faculty members was provided by the Dean's office. Departmental secretaries checked the list for accuracy. Two hundred and sixty-two faculty members were in the target population during the spring semester of 1997. All 262 faculty members were surveyed.

The questionnaire was designed by the researchers and included two Likert-type scales and one open-ended question. Twenty-two statements representing the academic rigor construct were generated from a review of literature and from input of faculty in agricultural education. College of agriculture teaching faculty were asked to indicate the extent to which they agreed with each statement for on-campus courses and for off-campus courses by using a five-point Likert-type scale with response options ranging from (1) strongly disagree to (5) strongly agree.

Faculty were also asked the following open-ended question. In your opinion, what are the most significant differences between on-campus and off-campus courses? Off-campus courses in agriculture are delivered through a variety of means at this university. Most involve communications media such as videotape and/or the world wide web. Although less common, some courses are taught in a traditional classroom using traditional teaching methods at a site far removed from the campus. For this study, faculty were not instructed to focus their thoughts about off-campus courses on a specific delivery method or course level (undergraduate or graduate).

Content and face validity for the questionnaire were established by a panel of six faculty in agricultural education. The Likert-type scales were pilot-tested for reliability with a group of 12 agricultural education graduate students. Cronbach's alpha was used to assess the reliability of the two Likert-type scales. Cronbach's alpha coefficients were .93 and .90 for the on-campus and off-campus academic rigor scales, respectively.

The questionnaire and a cover letter describing the project was sent to all members of the college of agriculture teaching faculty by campus mail. Two follow-ups of nonrespondents were conducted. One hundred thirty-two questionnaires were completed and returned for a response rate of 50.4%. Persons who had not responded 10 days after the final follow-up were considered nonrespondents. Nonresponse error was controlled by randomly sampling 10% (10) of the nonrespondents and gathering data from them. A t-test was used to determine if respondents and nonrespondents differed significantly in their overall perception of the academic rigor of on-campus and off-campus courses. No significant ($p<.05$) difference was found between respondents and nonrespondents. This procedure for handling nonresponse was used because it is the most empirically sound procedure available (Miller & Smith, 1983). Results were deemed generalizable to the population. Respondent and nonrespondent data were pooled yielding a final response rate of **54.2%.**

Analysis of Data

All data were analyzed with the SPSS for Windows personal computer program. Appropriate statistics for description were used including frequencies, percentages, means, standard deviations, Pearson correlations, and point biserial correlations. Davis' (197 1) descriptors were used to interpret the magnitude of all correlations. Exploratory factor analysis was used to identify factors underlying college of agriculture teaching faculty members' perceptions of the academic rigor of on-campus and off-campus courses. Procedures for conducting the factor analysis were patterned after those used by McCaslin and Torres (1992). Because data were gathered from the population instead of a sample, inferential statistics were not used for comparisons. Faculty responses to the open-ended question were analyzed for common themes related to the concept of academic rigor.

Results

College of agriculture teaching faculty who participated in the study were predominantly male (93.6%) and were on average 50 years of age. Regarding academic rank, 60.3 % were professors, 23.4% were associate professors, 14.9% were assistant professors, and 1.4% were instructors. On average, teaching accounted for 34.2% of the teaching faculty members' assigned responsibilities. The teaching faculty had an average of 17.6 years of teaching experience, taught 2.9 course sections per year, and taught an average of .6 course sections off-campus in the last three years. Thirty-seven percent of the teaching faculty had taught an off-campus course in the last three years, and more than half (52.2%) had participated in faculty development opportunities related to distance education.

A maximum likelihood (common factors) factor analysis was conducted to identify factors underlying college of agriculture teaching faculty members' perceptions of the academic rigor of on-campus and off-campus courses. Common factor analysis is appropriate when measured variables are assumed to be a linear function of a set of latent variables (Ford, MacCallum, & Tait, 1986). A factor solution was sought that would represent faculty perceptions of academic rigor for the on-campus context and the off-campus context.

Only factors with eigenvalues equal to or greater than one were retained before rotation. Also, a scree plot of the eigenvalues was used in deciding how many factors would be retained. It was determined that three factors were needed to represent faculty perceptions of academic rigor in on-campus courses and off-campus courses. A second maximum likelihood factor analysis procedure was conducted to extract the three factors for the on-campus and off-campus data. The three factors were not assumed to be orthogonal. Therefore, the oblimin rotation procedure was used (Raven, 1994). The factor pattern matrices for the on-campus and off-campus solutions were examined to determine if the three factors were similar for both contexts. Sixteen of 22 academic rigor statements loaded on the same factors in the on-campus and off-campus solutions. The six academic rigor statements that did not load on the same factors were eliminated and a maximum likelihood factor analysis was performed on the remaining 16 items to arrive at the final three factor solution.

Table 1 shows the rotated factor loadings for the final solution. An examination of the items and their factor loadings was used to understand the nature of the three factors. To reduce subjectivity, items with factor loadings equal to or greater than .4 were considered most important when factors were labeled.

The three factors were labeled (1) active learning, (2) effort, and (3) high cognitive levels. The three factors accounted for 56.0% and 60.1% of the variance in faculty perceptions of the academic rigor of on-campus and off-campus courses respectively (Table 2). The Cronbach's alpha reliability estimates for the on-campus academic rigor sub-scales were .82 for the active learning factor, .87 for the effort factor, and .88 for the high cognitive levels factor. The Cronbach's alpha reliability estimates for the off-campus academic rigor sub-scales were .86 for the active learning factor, .89 for the effort factor, and .91 for the high cognitive levels factor. The inter-factor correlations for the rotated factors ranged in magnitude from moderate to substantial (Table 3). Therefore, the factors are not independent of each other in explaining the academic rigor construct.

Logic would portend and previous research (Dillon & Walsh, 1992; Jurasek, 1993; Koontz, 1989) has supported the idea that faculty with distance teaching experience are more positive about distance education. Results of this study were different. The magnitude of the associations between participation in faculty development opportunities related to distance education and perceptions of the academic rigor of on-campus and off-campus courses were negligible (Table 4). In addition, six of the eight associations assessed between off-campus teaching experience and perceptions of the academic rigor of on-campus and off-campus courses were negligible (Table 5). The other two associations were low.

Table 6 shows the means and standard deviations for faculty perceptions of academic rigor for on-campus and off-campus courses. Overall, teaching faculty provided a higher mean score on the academic rigor scale for on-campus courses. In addition, teaching faculty provided higher mean scores for the active learning, effort, and high cognitive levels factors for on-campus courses. Higher mean scores were also given to on-campus courses on each of the 16 statements from the academic rigor scale.

Faculty were asked what, in their opinion, were the most significant differences between on-campus and off-campus courses. Comments were analyzed for themes and several comments were related to the issue of academic rigor. When faculty alluded to academic rigor, off-campus courses were described in more negative terms. A sample of faculty comments related to academic rigor follows:

> The level of demonstrated competence and achievement needed to earn a given grade or to pass a course is less for off- campus courses than it is for on-campus courses.

Table 1. Rotated factor loadings for faculty perceptions of academic rigor

Abbreviated items	Factor loadings On-campus	Off-campus
Factor one = Active learning		
Students explore course related resources	.70	.53
Students examine various perspectives	.60	.74
Students contribute to class discussions	.54	.57
Students evaluate diverse points of view	.52	.95
Students are active in the learning process	.41	.55
Factor two = Effort		
Students work hard to succeed	.79	.60
Students take challenging examinations	.77	.84
Students study outside of class	.74	.60
Grades are based on high academic standards	.73	.87
Courses are rigorous	.66	.75
Students complete high quality assignments	.49	.66
Students achieve academic excellence	.44	.56
Students complete substantial readings	.43	.29
Factor three = High cognitive levels		
Students synthesize course concepts	**.85**	.82
Students evaluate course concepts	.84	.76
Students analyze course concepts	.78	.83

Table 2. Percent of variance explained by factors underlying faculty perceptions of academic rigor

Factors	On-campus %	On-campus cum. %	Off-campus %	Off-campus cum. %
Active learning	41.3	41.3	6.3	6.3
Effort	10.4	51.7	47.7	54.0
High cognitive levels	4.2	56.0	6.1	60.1

Table 3. Interfactor correlations for the obliaue rotated factors underlying faculty perceptions of academic rigor

Factors	I On-campus (Off-campus)	II On-campus (Off-campus)	III On-campus (Off-campus)
Active learning (I)	1.00 (1.00)	.46 (-.63)	-.60 (.59)
Effort (II)		1.00 (1.00)	-.40 (-.58)
High cognitive levels (III)			1.00 (1.00)

Table 4. Associations' between perceptions of the academic rigor of on-campus and off-campus courses and participation[2] in faculty development opportunities related to distance education

Rigor factors	On-campus	Off-campus
Active learning	-.05	-.08
Effort	.06	.08
High cognitive levels	.06	.06
Rigor (overall)	.04	.04

Note. Point biserial correlations; participation was a nominal variable with 1 assigned to faculty who had participated and 0 to those who had not participated.

Table 5. Associations' between perceptions of the academic rigor of on-campus and off-campus courses and off-campus teaching experience[2]

Rigor factors	On-campus	Off-campus
Active learning	-.07	.01
Effort	-.08	.09
High cognitive levels	.02	.10
Rigor (overall)	-.04	.10

Note. Point biserial correlations; experience was a nominal variable with 1 assigned to faculty with experience in the last three years and 0 to those with no experience in the last three years

> Off-campus courses lack spontaneous interactivity, have less rigorous standards, and use lower grading standards.
>
> There is a tendency for instructors to accommodate and accept poorer academic achievement by off-campus enrollees. Off-campus courses do not have the same rigor in lab exercises. Many students who take off-campus courses begin with the expectation that other life/job things are most important.
>
> And this "course" should fit into their schedule. As a result, many of these students devote little or no outside time to class. The general feeling around here is that this is a travesty and grave injustice to our students who devote 2, 3, 4, or more years of their life to earning a degree on campus. If off-campus is so great, why do we need a campus?

Table 6. Means and standard deviations for faculty perceptions of academic rigor

Factors and abbreviated items	On-campus Mean"	SD	Off-campus Mean"	SD
Factor one = Active learning	**4.01**	.64	3.70	.77
Students explore course related resources	**3.98**	.82	3.54	.92
Students examine various perspectives	3.88	.88	3.80	.88
Students contribute to class discussions	4.26	.80	3.71	1.11
Students evaluate diverse points of view	3.74	.92	3.61	.93
Students are active in the learning process	4.22	.69	3.86	.99
Factor two = Effort	4.20	.53	**3.81**	.69
Students work hard to succeed	4.48	.60	4.06	.89
Students take challenging examinations	4.16	.65	3.71	.90
Students study outside of class	4.50	.56	4.26	.79
Grades are based on high academic standards	4.26	.69	3.87	.92
Courses are rigorous	4.08	.79	3.44	1.03
Students complete high quality assignments	4.23	.67	3.85	.90
Students achieve academic excellence	4.36	.70	3.87	.91
Students complete substantial readings	3.80	.95	3.39	.96
Factor three = High cognitive levels	4.25	**.71**	**3.91**	**.91**
Students synthesize course concepts	4.23	.78	3.87	**.97**
Students evaluate course concepts	4.14	.92	3.86	1.01
Students analyze course concepts	4.33	.67	4.00	.96
Overall M	4.21	.47	3.87	.63

"1 = strongly disagree, 2 = disagree, 3 = undecided, 4 = agree, 5 = strongly agree

Conclusions and/or Recommendations

Based on the results of this study, it was concluded that three factors underlie faculty perceptions of academic rigor. The factors are (1) active learning, (2) effort, and (3) high cognitive levels. The three factors are useful in explaining academic rigor in on-campus and off-campus courses. In addition, the three factors were consistent with the definitions of academic rigor found in the literature (Braxton, 1993; Unks, 1979). To provide a rigorous academic environment, one in which students are challenged to reach a level ofunderstanding of course content that reflects the extent of their own unique intellectual ability, faculty should account for each factor in developing, teaching, and administering their courses.

College teachers of agriculture can encourage active learning by creating opportunities for students to interact with course content, with the instructor, and with other students. Students should be encouraged to examine different points of view and contribute their own ideas to class discussions. Teaching faculty should encourage

students to expend effort in meeting high academic standards. Finally teaching faculty should expect students to operate at higher cognitive levels by formulating and teaching to objectives in the upper half of Bloom's (1969) taxonomy.

College of agriculture teaching faculty perceived off-campus courses to be less rigorous than on-campus courses. Notably, faculty perceptions of the academic rigor of on- and off-campus courses were independent of their participation in faculty development programs related to distance education and their experience with distance teaching. Are their perceptions well founded? Further research is needed to determine if off-campus courses do in fact provide less opportunity for active learning, require students to expend less effort, and result in lower level cognitive outcomes. If research can show that off-campus and on-campus courses are equivalent in terms of academic rigor, an effort should be made to educate college of agriculture faculty about this equivalence. Solid evidence will be needed to convince some faculty of the value of off-campus courses. Many faculty members hold strongly negative opinions of off-campus courses. For example, Wilson (199 1, p. 5) noted that "for long distance education has been perceived as a step-child of higher education; there has been the view that it is "a second-best substitute for on-campus instruction". . . tolerated, but not embraced."

Perhaps off-campus courses, as they are currently delivered, truly are less rigorous. If this is the case, agricultural education faculty should lead the way in developing and perfecting methods to get off-campus learners more active in the learning process, to ensure that off-campus learners must put forth effort equal to that of on-campus learners, and to teach and test at higher levels of cognition. With the teaching tools that currently exist there is no reason off-campus courses should be less rigorous. In dealing with the issue of academic rigor, agricultural educators should be principally concerned with enhancing the quality of both on- and off-campus courses for students.

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