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Curricular Assessment of Regular Academic Year Versus Summer Session Instruction

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Abstract. As the UCSB campus braces for anticipated enrollment surges, assessment of the effectiveness of summer instruction becomes increasingly important. In order to gauge the effectiveness of summer teaching, as compared to regular term courses, analyses presented here compare data across the same courses, taught by the same instructor, in substantially similar formats, with consistent student evaluation instruments. Findings indicate that students generally did not perform as well within 6-week summer session courses as they did within either regular academic session courses or 3-week summer session courses. Similar differences were found for improvement in courses over time, where students in the 6-week summer sessions generally failed to improve as much, or declined in performance more, than students in other session formats. Finally, majors performed better in these courses than nonmajors, indicating a form of intra-major advantage. Possible explanations for these findings are discussed and factors that should be examined in future research are considered.

Introduction

Enrollment in California's public colleges and universities is projected by the California Postsecondary Education Commission to increase in this decade by over 700,000 students, due to increases in the college-age population, higher college participation rates, and other factors. As the UCSB campus braces for these anticipated enrollment surges, assessment of the effectiveness of summer instruction becomes increasingly important. Unfortunately, reliable and valid data on teaching effectiveness are hard to come by: Only small numbers of courses are offered in the summer, and these are often taught in different formats, by different instructors, with different content, making comparisons problematic. In order to gauge the effectiveness of summer teaching, as compared to regular term courses, comparisons need to be made across the same courses, taught by the same instructors, in substantially similar formats, with consistent student evaluation instruments. Only then can valid comparisons be made that might shed light on the educational impact of summer session teaching. This type of evaluation is crucial as

UCSB considers various strategies to accommodate growing numbers of students in the years to come.

The goal of this White Paper is to provide precisely this type of analysis. Findings from this investigation serve as one means of assessment of the effectiveness of summer versus regular session instruction at UCSB. Although the findings reported here are instructive, it should be noted that the present analysis is limited in its scope and may not be generalizable beyond certain parameters, as discussed in greater detail in this paper.

Nature and Scope of Analysis

The analyses reported herein are based on the first author's experience as an instructor at UCSB. Teaching effectiveness (measured by student performance) is assessed across regular and summer sessions, based on data from courses in which substantially similar testing tools have been used, over an extended period of time. These data enable several relevant analyses that inform instructors' and administrators' assessment of the relative effectiveness of summer session versus regular academic year session teaching formats, and have implications for the quality of year-round curricula.

Analyses are based on data from 2 upper division, undergraduate courses in the Department of Communication (Comm 118: Communication Technology and Organization, and Comm 122c: Communication, Collaboration, and Organization). Data are used to assess student performance (a) in the regular academic year session compared to the summer sessions (both 3-week and 6-week summer session formats), (b) across students in the Communication major compared to nonmajors, and (c) over time from the midterm to the final exam.

The use of data from one instructor's courses has several advantages in this assessment effort, including control of any potential differences in instructor effectiveness and style and consistent course content and student expectations. Moreover, using a sample only of recent course offerings has several additional advantages. First, teaching evaluations have stabilized, and thus any differences in student performances are much less likely to be influenced by instructor maturation over time. Second, course content has also stabilized over time, and has remained consistent within this evaluation period. Third, the instructor has refined testing materials that have remained constant over the time periods analyzed. Overall, these factors help to guard against any confounding factors that might possibly affect evaluation results.

Method

Data from two courses were used to identify differences in student performance based on session format, academic major status, and improvement over time. Both courses have been recently taught in three different length formats: regular academic quarter, summer six-week session, and summer three-week session. Data for the analyses come from Comm 122c from the winter and

spring of 2003, and from the summers of 2002 (6 week session) and 2003 (3 week session); data from Comm 118 come from the spring of 2003, and from the summers of 2002 (6 week session) and 2003 (3 week session). Within each course, testing instruments were equivalent across the three formats and were similar across courses. Additionally, course formats for Comm 118 and 122 were relatively similar.

A total of 183 students completed these courses. Because the majority of students were of junior or senior rank, the 8 sophomores and the 6 students for whom status was unknown were excluded from analyses. Table 1 provides a breakdown of the remaining 169 students by course, session format, and class rank.

Table 1. Frequencies of Students by Course, Session Format, and Class Rank.

Format	Course	Junior	Senior	Total
Academic year				
	Comm 118	9	12	21
	Comm 122	18	34	52
	Total	27	46	73
6-week session				
	Comm 118	13	21	34
	Comm 122	19	21	40
	Total	32	42	74
3-week session				
	Comm 118	2	8	10
	Comm 122	3	9	12
	Total	5	17	22
Total		64	105	169

Data included midterm exam scores, final exam scores, and total exam scores, which were all standardized by converting scores to percentages. Additional assignments and evaluation materials (e.g., class participation) in the courses were not factored into the analyses, and comprised only a minor portion of total points for each course.

Across all courses, the mean score for the midterm exam was 71.37 ($SD = 13.12$), 71.01 ($SD = 13.09$) for the final exam, and 71.12 ($SD = 11.75$) for the total exam points in the course. Because no restrictions on enrollment with regard to major exist for summer sessions, students from the summer sessions were distinguished by major (i.e., Communication vs. non-Communication major). Of the 96 students enrolled in the summer courses, 31 (32.3%) were from majors other than Communication.

Results and Discussion

Although the cell sizes in most analyses reported are unequal, the statistical test used for these analyses (i.e., ANOVA) is relatively robust to this violation. Thus, unequal cell sizes do not pose a serious problem, particularly when only one factor is used to predict differences in the outcome variables (Tabachnik & Fidell, 2001). Additionally, the estimated marginal means are used in all analyses; these means are not weighted by the overall number of cases, thereby giving equal importance to cells regardless of the number of cases in each.

Preliminary analyses included class rank (i.e., juniors vs. seniors) as a potential predictor of performance. However, none of the analyses showed differences between juniors' and seniors' scores. Additionally, class rank did not moderate any of the relationships reported below. This is not especially surprising since greater differences would be expected between lower- and upper-classmen. As a result, class rank was excluded from all final analyses.

Differences in Session Format

The first set of analyses examined potential differences in students' scores by the three academic session formats (regular academic year session, 3-week summer session, and 6-week summer session). In order to assess the overall differences across class session formats, both courses (i.e., 118 and 122) were combined for this analysis. Separate ANOVA analyses were conducted for each score (i.e., midterm exam, final exam, and total exam scores).

Midterm exam scores did not differ by teaching session format. However, differences did exist for the final exam scores as well as for the total exam scores: Post hoc analyses showed that for both the final exam and total exam scores, the 6-week session scores were significantly lower than the academic year and 3-week session scores. The topmost rows ("Comm 118+122") of Table 2 list ANOVA results and means for this analysis.

Table 2. Unweighted Means for Midterm Exam, Final Exam, and Total Exam Scores Comparing Teaching Session Formats

	Academic Year	6-Week Session	3-Week Session	<i>F</i>	Adj <i>R</i> ²
Comm 118 + 122					
(<i>N</i> = 169)					
Midterm	71.84	70.11	74.07	0.852	.002
Final	74.16 ^a	66.65 ^{ab}	75.24 ^b	7.982*	.077
Total	73.11 ^a	68.10 ^{ab}	74.72 ^b	4.727*	.042
Comm 118					
(<i>N</i> = 65)					
Midterm	68.81	69.31	71.75	0.219	.025
Final	79.08 ^a	72.72 ^a	76.64	3.497*	.072
Total	74.52	71.01	74.47	1.213	.007
Comm 122					
(<i>N</i> = 104)					
Midterm	73.06	70.79	76.00	0.728	.005
Final	72.17 ^a	61.49 ^{ab}	74.07 ^b	8.345*	.125
Total	75.54 ^a	65.62 ^{ab}	74.93 ^b	4.310*	.060

Note. * $p < .05$. Matching superscripts within rows indicate significant differences between groups.

To probe whether differences may be more pronounced in one of the courses, separate analyses were conducted for Comm 118 and for Comm 122. For Comm 118, neither midterm exam scores nor total exam scores differed by session format, although differences were found for the final exam scores. Specifically, post hoc analyses indicated that final exam scores for the regular academic year session were significantly higher than scores for the 6-week session in Comm 118. See Table 2 (row labeled “Comm 118”) for mean values and comparisons.

Results for Comm 122 were more similar to the overall analyses. Midterm exam scores did not vary by session format, but both final exam and total exam scores showed significant differences. Again, for both final exam and total exam scores, the 6-week session scores were significantly lower than the academic year and 3-week session scores. The row labeled “Comm 122” in Table 2 lists these results.

It should be noted that although data from Comm 122 show more differences in student performance across the various session formats than data from Comm 118, these differences are likely due to disparity in the number of students enrolled in each course. Because Comm 122 had

substantially higher enrollment, analyses of data from Comm 122 possess more statistical power to detect differences between session formats.

Nonetheless, several conclusions may be drawn from these comparisons across teaching session formats. First, it appears that the differences in session format become more pronounced as the class progresses. In none of the analyses were differences found in midterm exam scores. Thus, when session format affects student performance, its influence does not appear until later in the course. Second, no direct relationship between student performance and course length was found: It may seem logical to expect that student performance would decrease as the length of the course decreases. Interestingly, however, the 3-week session scores were substantially higher than the 6-week session scores. In fact, the 3-week scores were equivalent to the regular academic year scores.

Possible explanations for these findings include meaningful differences in session formats, student self-selection biases, and a combination of these effects. With regard to potential differences in session formats, findings indicate that the 6-week course format may indeed be less optimal in terms of student performance than either the regular academic year or the 3-week session formats. Student self-selection may also be a factor. Students who opt to take relatively intense 3-week summer session classes may be especially motivated--or more capable--than students who select courses in the other session formats. Finally, differences could be explained through a combination of these factors. Recalling that midterm scores did not differ across any of the session formats, it is possible that the 6-week session draws students who are not as motivated or qualified as those in the 3-week session and who get caught somewhat offguard by the relatively accelerated pace of the 6-week session (compared to the regular academic year). As a consequence, students who may be less motivated/qualified (than those in the 3-week session) are also less able to maintain or improve their performance in the truncated 6-week session (as compared to the regular academic year session). Absent additional qualitative and quantitative evidence, however, it is difficult to determine which of these explanations is most compelling.

In addition, academic major status may affect these findings, to some degree. During the regular academic year, only Communication majors are allowed to enroll in upper-division Communication courses. By contrast, summer classes have unrestricted enrollment where any student, regardless of major, can take Communication courses. Because some upper-division courses are crafted assuming that the students have taken the prerequisite lower-division courses, pertinent background material may not be covered. This has the potential to make material in the course more difficult for non-Communication majors. That said, Comm 118 and Comm 122 do not rely heavily on prerequisite information from lower division courses. Alternatively, it is possible that Communication and non-Communication majors differ in their academic capabilities. To determine the extent to which academic major status may contribute to differences across session formats, the scores of Communication majors were compared to those of non-Communication majors.

Differences in Academic Major

These analyses were isolated to the 96 students enrolled in summer courses, and 3-week and 6-week sessions were combined to increase the statistical power necessary to detect any differences. In all three analyses (i.e., midterm exam, final exam, and total exam scores), the ANOVAs showed significant differences between Communication majors and non-Communication majors; Communication majors performed substantially better than non-Communication majors in summer sessions. See Table 3 for a summary of the ANOVA results as well as the corresponding means.

Table 3. Unweighted Means for Midterm Exam, Final Exam, and Total Exam Scores Comparing Communication and Non-Communication Majors (comparisons are from summer sessions courses only, and 3-week and 6-week sessions have been combined for analysis).

	Communication Majors	Non-Communication Majors	F	Adj R²
Comm 118 + 122 (N = 96)				
Midterm	73.22 ^a	66.40 ^a	4.956*	.040
Final	71.52 ^a	62.52 ^a	8.966*	.077
Total	72.16 ^a	64.29 ^a	8.175*	.070
Comm 118 (N = 44)				
Midterm	69.78	70.03	0.004	.050
Final	75.96 ^a	69.05 ^a	5.218*	.089
Total	72.95	69.57	1.101	.002
Comm 122 (N = 52)				
Midterm	75.99 ^a	63.00 ^a	9.058*	.136
Final	67.94 ^a	56.40 ^a	6.282*	.094
Total	71.52 ^a	59.33 ^a	8.390*	.127

Note. * $p < .05$. Matching superscripts within rows indicate significant differences between groups.

Because differences were found between the two courses, and because all cell sizes were sufficiently large to warrant analysis, analyses were again conducted on Comm 118 and 122 separately (see Table 3). Again, differences were more pronounced in Comm 122 (likely due to greater statistical power). In Comm 118, differences between Communication and non-

Communication majors were only found for the final exam scores. By contrast, differences were found for all scores in Comm 122. In all cases of significant differences, the Communication majors scored substantially higher than non-Communication majors.

Thus, overall, Communication majors do perform better than non-Communication majors within summer session courses, suggesting that major status may explain, at least in part, the lower scores in the 6-week session found above. To confirm or disconfirm this supposition, however, a test including both summer session (3- vs. 6-week) and major status would be necessary. Unfortunately, this analysis would not be appropriate with these data since one cell would contain too few cases for analysis ($N = 4$).

The differences between Communication majors and non-Communication majors raise the issue of potential disadvantages that students outside the major may face when taking Communication courses. Indeed, the differences in performance between students in- and outside the major are typically around 10 percentage points, suggesting that students outside the major may receive grades that could be a full letter grade lower than students in the major. Of course, differences may also be due to differences in ability, or a combination of factors. Future inquiry is necessary to determine whether non-Communication majors are taking the class pass/fail or for a letter grade (because non-majors may be more likely to take the course pass/fail and therefore put forth less effort than students taking the course for a letter grade). In addition, future research could assess student quality by comparisons of grade point averages or by comparison across other courses students may have taken in common.

Differences in Over-Time Performance

The final set of analyses examined potential differences in improvement across different session formats. Here, midterm exam scores were subtracted from the final exam scores to determine the level of improvement (or deterioration). Across all students and formats, the difference in midterm and final scores ranged from -35.20 to 32.00 percentage points. Overall, students did not improve as the session progressed ($M = -0.3605$, $SD = 11.74$). ANOVAs were conducted on the combined data as well as the data from Comm 118 and 122 separately to compare improvement scores across the session formats.

With scores combined for both classes, results show that the differences between scores from the academic year and the 6-week session were significant. Post-hoc analyses revealed that on average, students' performance in the academic year improved by more than two percentage points, whereas students' performance in the 6-week session deteriorated by more than three percentage points. Although students in the 3-week session improved slightly, post-hoc tests showed that they were not substantially different from the other two session formats. See the first row of Table 4 for a summary of these results and relevant means.

Table 4. Unweighted Means for Improvement in Scores Comparing Session Formats.

	Academic Year	6-Week Session	3-Week Session	F	Adj R ²
Comm 118 + 122	2.32 ^a	-3.46 ^a	1.17	4.885*	.044
Comm 118	10.27 ^a	3.41 ^a	4.89	2.988*	.059
Comm 122	-0.90 ^a	-9.30 ^{ab}	-1.93 ^b	8.167*	.122

Note. * $p < .05$. Matching superscripts within rows indicate significant differences between groups.

Considering each course separately, on average, students in Comm 118 had higher final exam scores as compared to their midterm exam scores. The reverse was true for Comm 122; students' performance generally deteriorated from the midterm to the final. ANOVA results for Comm 118 show that the regular academic session improvement was significantly higher than the 6-week session, but improvement in the 3-week session was not significantly different from either session. For Comm 122, students' scores from the 6-week session deteriorated significantly more than students in the academic year session or the 3-week session. Thus, consistent with earlier analyses of session formats, students' performance in the 6-week sessions either improved less or deteriorated more as compared to other session formats.

Conclusions and Areas for Future Inquiry

Several conclusions can be drawn based on these analyses, but several caveats must qualify these conclusions. First, findings indicate significant differences across course session type: students generally did not perform as well within 6-week summer session courses as they did within either regular academic session courses or 3-week summer session courses. Second, similar differences were found for improvement in courses over time, where students in the 6-week summer sessions generally failed to improve as much, or declined in performance more, than students in other session formats. Third, Communication majors performed better in these courses than did students from other majors, indicating a form of intra-major advantage.

Several possible explanations for these findings exist, each of which is open to a substantial degree of interpretation. Important potential explanations for cross-session differences include meaningful differences in the ways that students experience the various session formats, student self-selection biases, and a combination of these effects. Intra-major advantages may be explained by potential advantages that extend to those who have taken pre-major courses, or

other courses within the major, or by differences in capability and/or motivation across students from different majors.

However, the very factors that make the dataset used here highly reliable also may serve to make it less generalizable: Data were obtained from a single instructor, with a specific style and expectations, working in one academic department, fairly recently. To the degree that idiosyncrasies may occur due to these factors, results may not be applicable to other circumstances and conditions.

Finally, based on these findings, a number of factors should be considered in future analyses that strive to parallel the present exploration. For example, due to differences between the two courses analyzed here (i.e., Comm 118 and Comm 122), especially regarding improvement, future investigations should incorporate analyses of courses separately to find unique differences in course format and content as well as analyses across courses to identify general trends. In addition, although analyses do not generally explain a large portion of the variance in scores, this does not suggest that the differences found regarding session format are inconsequential. Across analyses, performance in the 6-week sessions was substantially lower than the other time formats. Finally, additional factors could add insight to these differences. For example, academic major status (i.e., in- or outside the major) should be explored further. The larger percentage of non-Communication majors in the 6-week session as compared to the 3-week session may explain, in part, the differences in exam scores as well as in improvement within the class. However, these data do not fully support this contention, nor does academic major status fully explain differences found. Numerous other factors not typically assessed may influence students' performance, such as previous GPA, taking the class pass/fail or for a letter grade, the number of other classes students are taking simultaneously, the classroom climate, etc. Class rank should also be incorporated into future analyses. Although differences were not found between juniors and seniors in the current analyses, differences across ranks may exist, particularly between lower- and upper-classmen.

Reference

Tabachnik, B. G., & Fidell, S. (2001). Using multivariate statistics. (4th ed.). Boston, MA: Allyn & Bacon.