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ON THE RELATIVE EFFECTIVENESS OF HYBRID AND FACE-TO- FACETEACHING

Burns et al (2013) assessed the impact of course delivery method (online versus hybrid versus F2F) of an Introduction to Information Systems course on the likelihood of receiving an exceptional (A), acceptable (B), or unacceptable (C, D, or F) course grade. The subjects were the 109 F2F, 155 online, and 129 hybrid students collectively taught by the same instructor over four semesters. The F2F students met in class twice weekly; the hybrid students had 10 in-class meetings and were "responsible for independent work supported by instructor-developed resources available to all students in all sections" (p 456) for weeks without in-classmeetings; and the online students had no in-class meetings.

All students were responsible for the same assignments and had access to recorded lectures and exam reviews. The F2F and online students had the option to receive assistance from the instructor during "several independent workdaysbefore final project due dates); the hybrid students had optional weekly support labs "staffed by the instructor, graduate assistants, and peer tutors" (p. 456). Four exams (all but one multiple-choice) were proctored in class for the F2F and hybrid students, but not proctored for the online students (though with the same time limitation as the F2F and hybrid students). Controlling for student GPA, age, gender, proximity to campus, class standing, and Pell Grant eligibility in an ordered probit model, the authors found that the likelihood of receiving a better grade was higher under F2F than either hybrid and online delivery, and that GPA was the most significant factor impacting (its impact was positive) the course grade regardless of delivery method.

Larson and Sung (2009) compared each of the grades on three exams and the numerical course grade of studentsin sections of an Introduction to Management Information Systems course taught by the same instructor under online (one section with 0 in-class meetings, and exams proctored at locations convenient to the students), hybrid (multiple sections, each with 11 weekly in-class meetings, 3 devoted to exams), or F2F (multiple sections, each with 16 weekly in-class meetings, 3 devoted to exams) delivery. For each weekly in-class meeting of the 63 F2F students, Larson delivered a lecture and raised discussion questions for class discussion. For each weekly online session, the 22 online students were expected to read lecture notes from the textbook publisher and were required to submit a detailed answer to one of a few discussion questions as well as respond to one other student's answer to the question. The 83 hybrid students' in-class meetings and online sessions mirrored those of the F2F and online students, respectively, except that whereas the online students were required to purchase the lecture notes, the hybrid and F2F students were not. The students in all three sections were as well assigned the same (unspecified) homework.

Each exam comprised true/false and multiple choice questions identical for all students, and essay questions similar across the online, hybrid, and F2F students. Based on one-way ANOVAs, no significant differences between the online, hybrid, and F2F students as to the grades on the three exams (whether including or excluding the essay questions portion) or the numerical course grade were found.

This study was conducted in the business college of a large public university where the majority of students work and commute to campus. All undergraduate business majors are required to take two quantitative methods courses, a lower-division introductory statistics course and an upper-division part statistics and part management science course (henceforth referred to as QM 3000) having the introductory statistics course as a prerequisite. QM 3000 is designed to convey a working knowledge of one-way ANOVA, simple and multiple linear regression, linear programming, forecasting methods, and decision analysis. Though instructing a fully online course at the university is predicated on the course as designed passing a QM Course Review and the instructor completing training on course design and pedagogy, the review and training are optional for instructors of hybrid courses. The instructor in this study elected to have the review and training. Her course design met every standard.

The subjects were the 77 students enrolled in one F2F section and 54 students enrolled in two hybrid sections of QM 3000 taught by the same instructor in the same (spring of 2015) term. The instructor had previously taught one section of QM 3000 under hybrid delivery, and several under face-to-face delivery.As indicated in Table 1, the hybrid and face-to-face (F2F) students were of comparable mean age, and—with GPA representing cumulative GPA at the beginning of the course—the mean GPA of the hybrid students was significantly and an estimated .17 grade points lower than that of the F2F students.

For each of fifteen weeks, the F2F students met in class for 75 minutes twice weekly and the hybrid students met in class for 75 minutes once weekly. In a typical (non-testing) week, the first class meeting for the F2F studentsfocused on introducing a new topic (e.g., one-way ANOVA, integer linear programming, decision making under uncertainty), and the second focused on associated real-world applications (and, where applicable, the associated use of Excel). For such a typical week, and consistent with what has been termed the "flipped model" of hybrid course delivery, the hybrid students were afforded the introduction to the new topic online and experienced the same class meeting focusing on real-world applications as did the F2F students.The instructor

referenced/used the same expositions in PowerPoint or Word documents for both the F2F and hybrid students when introducing new topics or referencing real-world applications or describing usage of applicable (e.g., Solver, Regression) tools, and additionally assigned for online study by hybrid students viewing narrated videos (whether professor-created or available through YouTube). For each of the three testing weeks, practice test questions were discussed in the F2F class and available online (with solutions) for all students. The F2F and hybrid students shared the identical learning objectives (listed in the syllabus), assigned textbook readings, five quizzes, three tests (on three respective modules, the first on ANOVA and linear regression, the second on linear programming, the third on forecasting and decision analysis), and an optional (in effect, able to replace the lowest test grade) cumulative final exam. Each quiz and test, and the final exam, comprised 20 multiple-choice questions. The five quizzes (each worth 20 points, with the higher of up to two attempts serving as the recorded grade) were non-proctored, evenly spaced throughout the term, and taken online. Each quiz was preceded by an online practice quiz for which solutions were subsequently provided so students could check their work. The tests and final exam (each worth 100 points) were proctored and taken in class. The numerical course grade (which could range from 0 to 100) was the average of the quiz grade total and the three highest of the test and final exam grades.

For both the F2F and hybrid students, the identical course material (including the aforementioned PowerPoint and Word documents and narrated videos)was posted to Deslire2Learn (D2L), the course management system used by the university for allof its courses.The upper-level organization of that material as posted to D2L (see Table 2) was identical for the F2F and hybrid students. The lower-level organization of the material differed between the F2F and hybrid sections in one key respect: for each topic, the material placed in an In class folder for the F2F students was subdivided into Online and In class folders for the hybrid students so that the hybrid students could readily locate the material supporting their online self-study on that topic. For both the F2F and hybrid students, optional material for students to explore the topic in more depth was placed in an Additional Materials folder.We recommend further research that focuses on the effect on student learning (in specific courses) of the choices of, and student time spent on, active and passive learning activities.

Анотація. Рудченко Т., Чашечникова О. Ефективність гідридного навчання face-to-face. *Представлено один з етапів виконання досліджень у рамках спільного україно-американського проекту по вивченню специфіки розвитку інтелектуальних умінь та творчого мислення учнів та студентів. Порівнювалася ефективність традиційного навчання та так званого «гібридного навчання», що передбачало поєднувати традиційне навчання та навчання он-лайн з метою компенсації зменшення так званих «контактних годин».*

Ключові слова: *навчання математики; гібридне навчання; навчання face-to-face.*

Аннотация. Рудченко Т., Чашечникова О. Эффективность гибридного обучения face-to-face. *Представлен один из этапов выполнения исследований в рамках совместного украино-американского проекта по изучению специфики развития интеллектуальных умений и творческого мышления учащихся и студентов. Сравнивалась эффективность традиционного обучения и так называемого «гибридного обучения», которое предусматривало сочетать традиционное обучение и обучение он-лайн с целью компенсации уменьшения так называемых «контактных часов».*

Ключевые слова: *обучение математике; гибридное обучение; обучение face-to-face.*

Summary. RudchenkoT., Chashechnikova O. On the relative effectiveness of hybrid and face-to-face teaching. *One of the stages of implementation of researches is presented within the framework of the general Ukrainian-American project on the study of specific of development of intellectual abilities and creative thinking of students and students. Efficiency was compared of the traditional educating and so-called "hybrid educating", envisaging combination of the traditional educating and educating on-line with the purpose of indemnification of reduction of the so-called "pin clock".*

Key words: *teaching mathematics; hybrid teaching; teaching of face-to-face.*

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ПРИНЦИП РОЗВИВАЛЬНОЇ НАСТУПНОСТІ В НАВЧАННІ МАТЕМАТИКИ

У ході розроблення концепції моделі навчально-математичної діяльності, в процесі створення теорії задач розвивальної математичної освіти втілювався принцип розвивальної наступності. Власне кажучи, на концептуальному рівні в теорію навчання математики впроваджено наукову ідею про доцільність постановки та розв’язування задач *чотирьох рівнів змістового теоретичного узагальнення.* Визначена ієрархія задач, з одного боку, забезпечує інтеграцію дедуктивної суті математики та діяльнісної теорії її навчання, а з іншого – забезпечує індивідуалізацію процесу учіння та вможливлює встановлення в навчанні математики однієї із чотирьох зон найближчого математичного розвитку [1].