BLENDED LEARNING READINGS

FREQUENTLY-CITED PUBLICATIONS

- Dahlstrom, E., Walker, J.D., & Dziuban, C. (2013). ECAR Study of undergraduate students and information technology, 2013. [Online]. Available: https://net.educause.edu/ir/library/pdf/ERS1302/ERS1302.pdf, Retrieved October 11, 2013.

ECAR has surveyed undergraduate students annually since 2004 about technology in higher education. In 2013, ECAR collaborated with more than 250 higher education institutions to collect responses from more than 112,000 undergraduate students about their technology experiences and expectations. This year's study reports that although not fully mainstream, ***students prefer blended learning environments.*** *Nearly four out of five U.S.-based students have taken a course with some online components and some face-to-face components.* ***The majority of students across all regions and Carnegie classes surveyed in the study reports that they both prefer and learn most in blended learning environments.*** *Using lecture capture tools, more robustly using the learning management system, and integrating students' personal computing/mobile devices into the learning environment are all on students' wish list from their instructors. They expect to have access to course materials inside and outside the class, and they want opportunities to integrate their digital device resources during class. Students value the ways in which technology helps them achieve their academic goals and prepares them for their future academic and workplace activities. About three out of four undergraduate students agree or strongly agree that technology helps them achieve their academic outcomes and about the same proportion agree that technology prepares them better for future educational plans.*

- Dziuban, C.D., Hartman, J.L., & Moskal, P.D. (2004). Blended Learning. *Educause Center for Applied Research, 7*, 1-12.

University of Central Florida, a leading institution in the nation on blended and online learning research, reports that, ***based on 7 years of research, blended courses have the potential to increase student learning outcomes while lowering attrition rates in comparison with fully equivalent online courses****. Additionally, blended learning results in success and attrition rates comparable to the face-to-face modality for all ethnicities. The study also reports a large ratio of faculty satisfaction with blended courses (88%).*

Not a new phenomenon.

Although the current conversations on blended, inverted, and/or flipped learning may lead one to believe that this is a recent and untested phenomenon, the blending of face-to-face instruction with various types of non-classroom technology-mediated delivery has been practiced in higher education for about five decades now. Even back in 2003, 81% of all higher education institutions and 97% of all public institutions offered at least one blended or online course. In 2011, a literature survey found close to 200 dissertations and hundreds of journal articles on the topic. Comparing educational environments and experiences solely based on modality (blended, online, or face-to-face) has the potential to disregard the effects of many other variables, such as the curriculum materials, instructional design and pedagogy aspects of the learning environment, quality of instruction, instructor involvement, student's level of readiness, time-on-task of student, and student motivation, etc. For example, a US Department of Education study on more than a thousand empirical studies of online learning identified over 50 independent effects that can be subjected to a meta-analysis. Nevertheless, it is understandable that policymakers, designers, researchers, and adopters need these comparisons to be able to be certain of the relative value of innovation. These questions about effectiveness are important in many aspects; not only in the early stages but also when the field matures to summarize the nature and impact on important outcomes, giving credibility to the change and also helping to focus it.

❖ Graham, C. R. (2013). Emerging practice and research in blended learning. In Moore, M. G. (ed), *Handbook of Distance Education,* 3rd edition, pp. 333-350. New York, NY: Routledge.

This chapter is an excellent synthesis of outcomes of blended learning research in the areas of learning effectiveness, learner satisfaction, faculty satisfaction, access and flexibility, and cost effectiveness, which concludes that ***blended learning environments lead to many desired and positive results****; however, more research is needed to uncover the reasons why – the modality (blended learning) enables many variables to cause these outcomes, but the interesting question to ask is, what are the primary variables or causal factors that lead to these improved outcomes?*

BLENDED LEARNING TOOLKIT

A larger bibliography of readings on blended learning is available at the Blended Learning Toolkit, which is a free, open repository of information, resources, models, and research related to blended learning. This work is funded by a Next Generation Learning Challenges grant and is a collaboration between the University of Central Florida and the American Association of State Colleges and Universities.

http://blended.online.ucf.edu/research/bibliography/

❖ Long, G. L., Vignare, K., Rappold, R. P., & Mallory, J. (2007). Access to communication for deaf, hard-of-hearing, and ESL students in blended courses. *International Review of Research in Open and Distance Learning, 8*(3), 13.

This study conducted at Rochester Institute of Technology ***emphasizes an important aspect of blended learning environments, which is increasing access and opportunities for larger groups of students, especially those who do not get the full benefit from mainstream education****. In this study, 908 students, divided into four groups (hearing, deaf, hard-of-hearing, and English as a second language students) responded to a survey that intends to understand student perceptions of communication.* ***The deaf and hard-of-hearing students reported that both the quality and quantity of their interactions with the professor and other students was greatly improved by the inclusion of an online component. ESL and hearing students were also positive about the blended experience;*** *but the greatest benefit to communication access was observed by students with a hearing loss.*

❖ Means, B., Toyama, Y., Murphy, R., Bakia, M., & Jones, K. (2009). Evaluation of evidence-based practices in online learning: A meta-analysis and review of online learning studies. Washington, D.C.: U.S. Department of Education, Office of Planning, Evaluation, and Policy Development. [Online] Available: http://www2.ed.gov/rschstat/eval/tech/evidence-based-practices/finalreport.pdf, Retrieved October 11, 2013.

This US Department of Education study comprises of a systematic search of the research literature from 1996 through July 2008 that identified more than a thousand empirical studies of online learning. The meta-analysis that focused on 45 of these studies where effect sizes can be generated, found that, on average, students in online learning conditions performed modestly better than those receiving face-to-face instruction, but ***students in conditions that blended elements of online and face-to-face instruction performed significantly better****.*

❖ Moskal, P.D., Duziuban, C., & Hartman, J.L. (2013). Blended learning: A dangerous idea*? Internet and Higher Education.* 18, 15-23.

Authors build the case for alignment of institutional, faculty, and student goals for the success of blended learning programs. ***Based on the data collected over 16 years at the University of Central Florida, web-based blended courses yield the highest success rates (90.8%) producing an approximately 6% advantage over blended lecture capture classes. The inverse trend emerges when one examines the withdrawal rates showing that students in blended courses tend to withdraw at approximately half the rate (2.8%) than they do in lecture capture courses (5.3%).*** *The benefits of blended learning far outweigh the costs: higher quality learning, improved teaching, increased access and opportunity,*

authentic assessment, maximized resources, improved student success and satisfaction, improved return on investment, increased faculty satisfaction, reduced withdrawal rates and a better sense of engagement.

- Peercy, P.S. & Cramer, S. M. (2011). Redefining quality in engineering education through hybrid instruction. *Journal of Engineering Education, 100*(4), 625-629.

This guest editorial reiterates the need for reform in engineering education and argues, with support from blended learning research, that ***hybrid teaching holds the potential to address many problems of today's engineering education by taking faculty out of the easily automated business of verbal delivery of information and allowing them to focus on interaction with students that develop critical thinking skills.*** *However, the authors urge that successful hybrid teaching cannot be a mish-mash of traditional teaching with some online content, but rather a mindful analysis and re-design of course pedagogy and meaningful interactions with students.*

SAMPLE EMPIRICAL STUDIES FROM ENGINEERING / SCIENCES

Alonso, F., Manrique, D., Martinez, L., & Vines, J.M. (Aug. 2011). How blended learning reduces underachievement in higher education: An experience in teaching computer sciences," *Education, IEEE Transactions on*, 54(3), 471-478.

Bland, L. (2006). *Applying flip/inverted classroom model in electrical engineering to establish life-long learn*ing. Annual ASEE Conference and Exposition, June 18, 2006 - June 21, 2006, Chicago, IL.

Carlisle, M. (2010). *Using YouTube to enhance student class preparation in an introductory Java course*. SIGCSE'10, Milwaukee, Wisconsin, USA, ACM 978-1-60558-885-8/10/03, March 10-13, 2010.

Chuang, W. (2002). An innovative teacher training approach: Combine live instruction with a Web-based reflection system. B*ritish Journal of Educational Technology*, *33*, 229–232.

Cortizo, J.L., Rodriquez, E., Vijanda, R., Sierra, A., & Norega, A. (2010). Blended learning applied to the study of mechanical couplings in engineering*. Computers & Education, 54*, 1006-1019.

Frydenberg, M. (2012). Flipping Excel. 29th Information Systems Education Conference, ISECON 2012, November 1, 2012 - November 4, 2012, New Orleans, LA, United States, Association of Information Technology Professionals. 2012 EDSIG

Gannod, G. C., J. E. Burge, J. E. , & Helmick, M. T. (2008). Using the inverted classroom to teach software engineering. *Proceedings of the ACM/IEEE 30th International Conference, Software Engineering, ICSE,* 777-786, May 10-18, 2008.

Hasegawa, S., Kashihara, A., & Toyoda, J. (2003). E-learning library with local indexing and adaptive navigation support for Web-based learning. *Journal of Educational Multimedia and Hypermedia, 12*, 91–111.

Hoic-Bozic, N.; Mornar, V.; Boticki, I., A. (Feb. 2009). Blended learning approach to course design and implementation, *Education, IEEE Transactions on*, 52(1), 19-30.

WHAT IS AN INVERTED (FLIPPED) COURSE?

A course, which follows the pedagogical model of reversing the traditional in-class (lecture) and out-of-class (homework) elements of a course. Frequently in this model, students view short-recorded lectures before coming to class, while in-class time is devoted to exercises, projects, or discussions. As this is a pedagogical model, not a course modality, inverted (flipped) model can theoretically be implemented in any modality. However, it is widely implemented in blended learning, where, out-of-class time is intended for passive and transactional learning activities (i.e. reading, watching videos, taking quizzes, etc.) and in-class time is devoted to active and transformational activities (i.e. applications of concepts, collaborative group work, problem solving, and social interaction among students, etc.).

Jaster, R. (2013). *Inverting the classroom in college algebra: An examination of student perceptions and engagement and their effects on grade outcomes*. Unpublished dissertation. Texas State University-San Marcos.

Kaw, A. & Hess, M. (2007). Comparing effectiveness of instructional delivery modalities in an engineering course. *International Journal of Engineering Education, 23*(3), 508–516.

Laman, J. A., Brannon, M. L., & Mena, I. B. (2012). *Classroom flip in a senior-level engineering course and comparison to previous version*. ASEE Annual Conference and Exposition, June 10-13, 2012, San Antonio, TX. Available: http://www.asee.org/public/conferences/8/papers/4028/view, Retrieved October 13, 2013.

Lovea, B., Hodgea, A., Grandgenettb, N., & Swifta, A. W. (6 September 2013). Student learning and perceptions in a flipped linear algebra course. *International Journal of Mathematical Education in Science and Technology*.

Marcey, D.J. & Brint, M.E. (2012). *Transforming an undergraduate introductory biology course through cinematic lectures and inverted classes: A preliminary assessment of the CLIC model of the flipped classroom*, 2012 National Association of the Biology Teachers Conference, October 31 - November 3, 2012, Dallas, TX. Available: http://www.nabt.org/websites/institution/File/docs/Four%20Year%20Section/2012%20Proceedings/Marcey%20&%20Brint.pdf, Retrieved October 13, 2013.

Papadopoulos, C., Santiago-Román, A. & Portela, G. (2010). *Work in progress — Developing and implementing an inverted classroom for engineering statics*. Frontiers in Education Conference (FIE), IEEE, October 27-30, 2010. Available: http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=5673198&isnumber=5673102, Retrieved October 13, 2013.

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Riffell, S.K., & Sibley, D.F. (2003). Student perceptions of a hybrid learning format: Can online experiences replace traditional lectures? *Journal of College Science Teaching, 32*, 394-399.

Shekhar, K. M., Tsang, P. L., Hung, L. & Cheng, J. C. Y. (2003). Fostering critical thinking skills through web based tutorial program for final year medical students—A randomized controlled study. *Journal of Educational Multimedia and Hypermedia, 12*, 267-273.

Strayer, J. (2012). How learning in an inverted classroom influences cooperation, innovation and task orientation, *Learning Environ Res*, *15*, 171-193.

Strayer, J. (2007). *The effects of the classroom flip on the learning environment: A comparison of learning activity in a traditional classroom and a flip classroom that used an intelligent tutoring system*. Unpublished dissertation. Ohio State University. Available: http://rave.ohiolink.edu/etdc/view?acc_num=osu1189523914, Retrieved October 13, 2013.

Talbert, R. (2012). *Learning Matlab in the inverted classroom*. ASEE 2012 Annual Conference, June 10-13, 2012, San Antonio TX. Available: http://www.asee.org/public/conferences/8/papers/3680/view, Retrieved October 14, 2013.

Thomas, J. S. & Philpot, T. A. (2012). *An inverted teaching model for a mechanics of materials course*. Proceedings of the ASEE Conference, June 10-13, 2012, San Antonio, TX. Available: http://www.asee.org/public/conferences/8/papers/4331/view, Retrieved October 13, 2013.

Toto, R. & Nguyen, H. (2009). *Flipping the work design in an industrial engineering course*. 39th Annual Frontiers in Education Conference: Imagining and Engineering Future CSET Education, October 18-21, 2009, San Antonio, TX.

Zappe, S., et al. (2009*). "Flipping" the classroom to explore active learning in a large undergraduate course.* ASEE Annual Conference and Exposition, June 14-June 17, 2009, Austin, TX.

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