Utilizing student views of online, on-ground, and virtual rotation instructional modalities for future development of blended learning strategies

Peter Draus, Robert Morris University, draus@rmu.edu

Abstract

A survey of students views of three different learning modalities, on-ground, online and virtual rotation was completed, and a qualitative thematic analysis of the results was conducted to assist in the development of more effective blended learning environments such as the inclusion of MOOC's into an on-ground course. The survey gathered what the students like best and disliked the most about each modality.

Keywords: information technology, teaching modality, student opinions, strengths/weaknesses

Introduction

The global pandemic that started in 2020 impacted education in many ways, but a major component was a vast implementation of different online instructional modalities. Many researchers looked at the effectiveness of the online instruction. (Lockee, (2021) Firmansyah, R., Putri, D., Wicaksono, M., Putri, S., Widianto, A., & Palil, M. (2021) Doyumgaç, I., Tanhan, A., & Kiymaz, M. S. (2021) Lee, J., & Jung, I. (2021)) Other researchers included blended learning (Draus, 2020, 2021) and included student satisfaction, not just performance in their evaluation metrics. (Kovacs, Peslak, Kovalchick & Wang 2018) This move to more online instruction has been occurring for many years but the pandemic accelerated the transition. While schools have returned to more classroom instruction, different modalities are still being utilized. One of the instructional strategies is to utilize a blended learning environment. Such environments include multiple methods of online instruction and recently some institutions have started to include the use of Massively Online Open Courses (MOOC's) for further enhancement of the learning outcomes. (Bruff, Fisher, McEwen, & Smith (2013) Such innovative online instructional strategies will lead the way for future blended learning environments. The goal of this research is to look at how we can leverage what we know about student's attitudes on individual leaning modalities as we move to develop other modalities to meet future challenges.

Learning Modalities

Three popular modalities of instruction include on-ground, online and virtual rotation. (Draus, 2020) Virtual Rotation is an instructional Strategy where a group of students is split into two sub-groups. The sub-groups then switch between on-ground classroom instruction and synchronous online instruction. (Robert Morris University, 2021,4,12) This modality was implemented due to the pandemic and is designed to allow for social distancing without reducing class size. This method might not be considered blended for most researchers as it only used in person and online modalities and rotates simply by time and not by content using multiple instructional environments. (Polhun, et al, 2021)

In an examination of current research that looked at the teaching difference between online and on-ground instruction, Lockman & Schirmer found that most effective teaching strategies cut across the modality. They did find some methods that improves online instruction and one of those was "opportunities for synchronous class sessions. (Lockman & Schirmer 2020, p130) This desire for some form of blended learning experience appears to be a path forward for future learning modalities.

Blended Learning

Blended learning modalities encompass a broad range of environments, but all include some form of online instruction and some form of on-ground instruction.

In a review of literature on blended learning, Nortvig et al (2018) concluded that some factors that lead to positive results included, "educator presence in online settings, interactions between students, teachers and content, and designed connections between online and offline activities." (Nortvig, A. M., Petersen, A. K., & Balle, S. H. 2018 p 46) It is imperative that there are connections between the on-ground and online course content and design.

Some researchers found students enjoyed working in a blended environment, but that their level of enjoyment was related to their performance in such a learning environment. (Akkoyunlu & Soylu, 2006) Yam and Rosini (2011) found that online by itself was superior to blended for those students accustomed to online instruction: supporting the notion that the students' experiences are more important than the modality itself. (YAM and Rosini, 2011) Other researchers have found little or no improvement in content learning, but found blended learning environments improved performance in the affective domain. (McCutcheon, K., O'Halloran, P., & Lohan, M. 2018) Other researchers found similar results in that there were no discernable differences in performance in a blended environment, but students felt unsupported in their learning activities. (Lim, Morris, & Kupritz, 2007) Clearly blended learning is an appropriate strategy, given it can perform as well as on-ground instruction, but specific design considerations must be utilized.

If we are to look at developing a blended environment that is both effective and satisfies students it makes sense to survey students to find not only their preferences for modalities, but to look at their views on the positives and negatives of the different modalities. There has been mixed results in performance evaluation in a blended learning environment. (Draus, 2020, Draus 2021) Other researchers working across multiple universities found no differences in modalities, but student preferred on-ground over online with blended in the middle. (Kovacs, Peslak, Kovalchick, & Wang. 2018)

MOOCs and Modality Research

One of the online components that have been utilized in blended learning is the use of MOOC's. A review of 48 research studies on MOOC's and blended learning found generally positive outcomes. (Eradze, Urrutia, Reda & Kerr 2019) While many MOOC's are set up as standalone courses, they have been incorporated into regular courses in higher education, to create a blended learning environment. A report on the use of a MOOC in a blended discreet math course yielded positive results both in performance and students' view of the experience. (Bralić, A., & Divjak, B. 2018) These positive outcomes were also reported in another trial of MOOC's in a machine learning course. (Bruff, Fisher, McEwen, & Smith (2013) Ishmail (2022) proposes that MOOC's were an effective modality during the pandemic and that MOOC's should be part of the new learning environment.   MOOC's are an excellent vehicle to examine student centered factors in online learning. An analysis of recent research trends in online learning, Distance Learning and Blended Learning, found MOOCs as the second highest theme. (Park & Shea 2020) One of

the key components of many modalities outside of lecture is the need for self-directed learning. In researching effective strategies for the development of MOOC's Zhu wrote, "Self-directed learning (SDL) is vital in different educational settings." (Zhu, 2021, p.441) One of the key factors for all successful learning is student motivation. Luik & Lepp (2021) categorized four types of motivation using students in a MOOC designed to teach programing. The four types of motivation were Opportunity motivated, Over-motivated, Success motivated and Interest motivated. (Luik, P & Lepp, M (2021) If we are to incorporate MOOC's into a blended learning environment we need to design them to not be stand alone, but to be incorporated into the on-ground component of the blended course. It is this area that we need to look at student feedback for guidance.

Theoretical framework

The theoretical foundation for this study was Bronfenbrenner's ecological systems theory (1977,1979). This theory has been used successfully as a foundation to research in this area previously. (Lee, J., & Jung, I. (2021) Doyumgaç, I., Tanhan, A., & Kiymaz, M. S. (2021) Hong, J. C., Lee, Y. F., & Ye, J. H. (2021). This theory looks at how different areas of a student's (person) environment impacts their development and change. Bronfenbrenner lists four different areas that impact this change: the micro-system, meso-system, exo-system, and macro-system. (Bronfenbrenner, 1977, pp. 514–515) These systems start at the closest to the individual with the micro-system, which includes such environments as home and school. The next layer out is the meso-system, which incorporates the connections between the micro and exo-systems. The third layer/system is the exo-system, which includes an individual's community and social inputs.   The macro-system is the final layer and includes the individual's culture. (Bronfenbrenner & Evans, 2000) In this context, we are looking at the micro and meso-systems as students own environment impacts their learning.

Johnson (2018), writing on the need for a new model of accountability in education wrote, "Within the field of education, there has been a growing recognition of the importance of context in understanding various aspects of education" (Johnson, 2018, p.41) to support the use of Bronfenbrenner's ecological systems theory as a basis for understanding student performance. Ozaki, Olson & Pizzolato, J. E. (2020) utilized this theory when looking at the impact of the environment on the persistence levels in higher education students. It is this focus on the learning environment that makes the ecological systems theory so attractive.

Methodology

The goal of this research was to gather data on the student's perceptions of the positive and negative aspects of three learning modalities: online, on-ground and virtual rotation. This is a study consisting of a qualitative thematic analysis including one round of thematic reduction. An online survey was administered over a nine-month period to students in six courses. The courses were a mix of graduate and undergraduate: online and on-ground instruction at a private university. Students self-selected into the courses, and the survey was not required as part of the course nor were there bonus points given for completion.

The online survey consisted of open-ended questions pertaining to online, on-ground and virtual rotation teaching modalities and the aspects of those modalities the students liked and disliked. The survey was not about any particular course, but on the student's general view of the modality. Finally, the students were asked what their preferred modality was. No incentive was given to the students to complete the questionnaire.

No other demographic data was collected or available to connect to the survey results.

Results

The survey was completed by 72 students with the mix of course modalities shown in Table 1. As can be seen, approximately half of the students were master's and half undergraduate.

Table 1 Mix of Course types where data was collected.

Course Type	Count	%
Masters	33	46
Undergraduate	39	54
On-ground	17	24
Online	55	76

Exactly 50% of the students surveyed preferred on-ground instruction and almost 40 % preferred online instruction. The exact counts can be seen in Table 2.

Table 2 Student Course Modality Preference

Format Preference	count	%
No Preference	6	8
Online	27	38
On-Ground	36	50
Virtual Rotation	3	4

For on-ground instruction the students reported the following positive themes as shown in Table 3. The themes are not surprising and mostly involve the synchronous, interactive learning atmosphere.

Table 3 Positive Themes for On-Ground Instruction

Theme	Example	Count	%
Easy discussion	"Easier to ask professor's questions and get personalized help."	9	13
Easy questions	"The ability to ask questions on the spot. "	19	26
Immediate feedback	"Interacting with the professors helps a lot. Sure, I can send emails but it feels very impersonal and I was never really a fan of communicating asynchronously."	16	22
Interactivity	"I think the interactive nature of on-ground teaching"	7	10
Atmosphere promotes Learning/ Focus	The classroom environment really helps me stay focused. " "Being in person, I feel like students are more likely to pay attention to class and actually learn the information."	25	35
Connectivity to professor/students	"Interaction with the professor/other students"	22	31

For on-ground instruction the students reported the following negative themes as shown in Table 4. The themes fall into two broad categories, pacing and convenience.

Table 4 Negative Themes for On-Ground Instruction

Theme	Example	Count	%
Inconvenient	"The inconvenience of having to drive to campus if you are a commuter."	26	36%
Time constraints/Scheduling	"The rigidity of lecture-based classes puts a lot of emphasis on a long attention span." "The least effective is sometimes they get in the way of your schedule "	23	32%
Pacing/Length of class	"You cannot go at your own pace. " The least effective aspect of on-ground courses may be the time limit. "	9	13%
Physical environment	"Some students can't see the front board in the class which I'm sure hurts their learning a bit."	4	6%

Table 5 lists the positive themes for online instruction. As might be expected, they are similar to the negative themes for the on-ground instruction with Flexibility and Convenience far and away the leading positive themes. Table 5 displays the themes and counts for the online positive themes.

Table 5 Positive themes for Online Instruction

Theme	Example	Count	%
Flexibility/Pace	"The flexibility of not having regularly scheduled meetings except occasional ones." "I can work at my own pace!"	29	40%
Convenient	"convenient to other things that you would like to add plus the comfort"	37	51%
Easier	"Most exams for online classes are online which makes the tests easier. "	2	3%
Format enhances learning		11	15%

The similarities between the positive on-ground and negative online mirror the results just mentioned, with slow interactions being the theme with the highest count as shown in Table 6. Interestingly enough, the second highest count was to the theme of feeling of isolation, a theme that doesn't really have a counterpart in the on-ground question. Another interesting theme was the workload. The majority in this theme stated the workload was too high.

Table 6 Negative Themes for Online Instruction

Theme	Example	Count	%
Slow feedback	"You do not get instant feedback when you have questions or are stuck. "	22	31%
Slow discussions	"Lack of back and forth discussing various topics which can help deepen understanding of a topic. "	5	7%
Lack of social interaction/ Feeling disconnected	"I don't enjoy the lack of social interaction that is inherent in online coursework" "I very much dislike how disconnected you can feel as a student in an online class."	21	29%
Easy to fall behind/lost focus	"Easy to get distracted and behind with work" "It is hard to stay focused being solely online."	9	13%
Self-studying	"I've had to do a lot more independent studying with online teaching compared to on-ground classes."	9	13%
Workload (too much/too little)	"I think that a massive amount of coursework is an ineffective way of teaching." "The lack of comprehensive sometimes."	9	13%

The synchronous opposition between online and on-ground might lead the researcher to think that virtual rotation would be the best of both worlds, and in fact it was the highest count theme, yet the count was very low as shown in table 7. Overall most of the students did not have much positive feedback about the virtual rotation. An interesting facet of this modality was that this is the only modality that students felt the need to post negative comments in response to the survey question that asked what they liked best.

Table 7. Positive Themes for Virtual Rotation Instruction

Theme	Example	Count	%
Best of both worlds (online/in classroom)	"Get the good aspects of in person and online learning"	8	11%
Backup option/skip class/recorded lectures	"It is nice to always have the backup option to watch a lecture virtually for a number of reasons. " "Having the choice to be in person or online depending on what is most comfortable. "	8	11%
Fewer distractions in classroom	"Less people in the classroom which leads to less distractions."	2	3%
Nothing	" I hated them" "nothing" "I'm not a fan"	5	7%

It is interesting to note that virtual rotation is the only modality where the count of the negative comments was greater than the positive theme count. The themes and low counts can be seen in Table 8.

Table 8. Negative Themes for Virtual Rotation Instruction

Theme	Example	Count	%
Confusing	"The least effective aspect of virtual rotation is just the scheduling. It can be difficult to know when to attend and when to stay home."	11	15%
Easy distractions	"It is easy to get distracted while doing the class at home/in your room."	14	19%
Unfairness	"Half of people taking quiz on-ground and half online." "In a rotation, I saw less students coming to class for the on-ground that were supposed to come. Some students would just always stay online and never came to class. " "When you are on the virtual day you do not learn as well do to the quality of the stream. "	10	14%
Lack of peer communication	"lack of connection with professor" "The least effective aspect is the communication between peers. "	2	3%
Worst of both worlds	"Instead of being the best of both worlds, it's the worst. "	3	4%

Discussion

Students reported "Speed of feedback" and "Interactivity with peers and professors" as the major advantages of on-ground instruction. With online instruction students reported flexibility and pacing as the major advantages. This supports previous findings, "the most positive impact with online learning experiences is the class structure that supports flexibility." (Crews & Butterfield (2014). p. 38) The virtual rotation option's highest positives were that it was the best of both modalities and provided an opportunity to review lectures. Negative views basically mirrored the positive with "Inconvenient" and "Scheduling issues" being the highest negative themes for the on-ground modality and "Slow feedback" and "Low interactivity" rating the highest negative for online instruction. Virtual rotation had "Confusing" and "Easily distracted" as the two highest negative themes. It has been suggested that the use of active learning activities in online environments can increase interactivity, which would improve one of the drawbacks to online environment. (Tanis, C. J. 2020) This research supports that view. One of the features of using a MOOC is that the instructor is not the key focus for interactivity in the course, but peer-to-peer interaction is stressed. The inclusion of machine grading in a MOOC would also improve the speed of the feedback. Both of these aspects would improve the online component in a blended environment.

The lack of any interaction between the student's preferred modality and the themes that were developed tends to support the themes as more universal to the modality and not specific to the students. Additionally, the lack of interaction between the level of the course and the modality of the course for data collection also tends to support these themes as relating to the modality itself and not influenced by some confounding factor.

Conclusion

It is clear that the student's views of on-ground and online instruction tend to be opposite, with the positives on one being the negatives of the other. For example, the slower feedback in online instruction is viewed

as a negative, while the instantaneous feedback of on-ground is viewed as a positive. Convenience and flexibility fit this same model.

While the virtual rotation model had some proponents, it generally had the highest negative feedback of any of the three modalities. It looks like a learning environment that blends the two modalities could have the positives of both modes. The virtual rotation is a poor implementation of modern blended environments. It should also be noted that this data was gathered from a single instructor in a single field of study and is a small data set.

As we move forward in the development of more blended learning environments, we should strive to reduce the negative and enhance the positive aspects of each modality and not just rely on the use of both as a balance against the other; be this in a MOOC or other online aspect of a blended learning environment.

References

Akkoyunlu, B., & Soylu, M. Y. (2006). A study on students' views on blended learning environment. Turkish Online Journal of Distance Education, 7(3), 43-56.

Bralić, A., & Divjak, B. (2018). Integrating MOOCs in traditionally taught courses: achieving learning outcomes with blended learning. International Journal of Educational Technology in Higher Education, 15(1), 1-16.

Bruff, D. O., Fisher, D. H., McEwen, K. E., & Smith, B. E. (2013). Wrapping a MOOC: Student perceptions of an experiment in blended learning. Journal of Online Learning and Teaching, 9(2), 187.

Bronfenbrenner, U. (1977). Toward an experimental ecology of human development. American psychologist, 32(7), 513.

Bronfenbrenner, U. (1979). The ecology of human development: Experiments by nature and design. Harvard university press.

Bronfenbrenner, U., & Evans, G. W. (2000). Developmental science in the 21st century: Emerging questions, theoretical models, research designs and empirical findings. Social development, 9(1), 115-125.

Crews, T., & Butterfield, J. (2014). Data for Flipped Classroom Design: Using Student Feedback to Identify the Best Components from Online and Face-to-Face Classes. Higher Education Studies, 4(3), 38-47.

Doyumgaç, I., Tanhan, A., & Kiymaz, M. S. (2021). Understanding the most important facilitators and barriers for online education during COVID-19 through online photovoice methodology. International Journal of Higher Education, 10(1), 166-190.

Draus, P. (2020) Impact of Student Engagement Strategies On Video Content in Learning Computer Programming and Attitudes Toward Video Instruction That was Developed Based on the Cognitive Theory of Multimedia Learning. *Issues in Information Systems 21(3).*

Draus, P. J. (2021). The impact of virtual rotation on student engagement and performance. Issues in Information Systems, 22(2), 276-284.

Eradze, M., León Urrutia, M., Reda, V., & Kerr, R. (2019). Blended learning with MOOCs. *European MOOCs Stakeholders Summit*, 53-58.

Firmansyah, R., Putri, D., Wicaksono, M., Putri, S., Widianto, A., & Palil, M. (2021). Educational Transformation: An Evaluation of Online Learning Due to COVID-19. International Journal of Emerging Technologies in Learning (iJET), 16(7), 61-76.

Ismail, O. (2022). Emerging Learning Environments and Technologies Post Covid-19 Pandemic: What's Next?. Advances in Information, Communication and Cybersecurity: Proceedings of ICI2C'21, 357, 308.

Johnson, E. S. (2018). Ecological Systems, Complexity, and Student Achievement: Towards an Alternative Model of Accountability in Education. School Leadership Review, 3(3), 4.

Kovacs, P., Peslak, A., Kovalchick, L., & Wang, W. (2018). Attitudes toward course delivery: A multi-university study of online, on-ground, and hybrid instruction. Information Systems Education Journal, 16(4), 27.

Lee, J., & Jung, I. (2021). Instr
uctional changes instigated by university faculty during the COVID-19 pandemic: the effect of individual, course and institutional factors. International Journal of Educational Technology in Higher Education, 18(1), 1-19.

Lim, D. H., Morris, M. L., & Kupritz, V. W. (2007). Online vs. blended learning: Differences in instructional outcomes and learner satisfaction. Journal of Asynchronous Learning Networks, 11(2), 27-42.

Lockee, B. B. (2021). Online education in the post-COVID era. Nature Electronics, 4(1), 5-6.

Lockman, A. S., & Schirmer, B. R. (2020). Online instruction in higher education: promising, research-based, and evidence-based practices. Journal of Education and e-Learning Research, 7(2), 130-152.

Luik, P., & Lepp, M. (2021). Are Highly Motivated Learners More Likely to Complete a Computer Programming MOOC?. International Review of Research in Open and Distributed Learning, 22(1), 41-58.

McCutcheon, K., O'Halloran, P., & Lohan, M. (2018). Online learning versus blended learning of clinical supervisee skills with pre-registration nursing students: A randomised controlled trial. International Journal of Nursing Studies, 82, 30-39.

Nortvig, A. M., Petersen, A. K., & Balle, S. H. (2018). A Literature Review of the Factors Influencing E Learning and Blended Learning in Relation to Learning Outcome, Student Satisfaction and Engagement. Electronic Journal of E-learning, 16(1), pp46-55.

Ozaki, C. C., Olson, A. B., Johnston-Guerrero, M. P., & Pizzolato, J. E. (2020). Understanding persistence using a phenomenological variant of ecological systems theory. *Community College Review*, *48*(3), 252-276.

Park, H., & Shea, P. (2020). A Review of Ten-Year Research through Co-citation Analysis: Online Learning, Distance Learning, and Blended Learning. Online Learning, 24(2), 225-244.

Polhun, K., Kramarenko, T., Maloivan, M., & Tomilina, A. (2021, March). Shift from blended learning to distance one during the lockdown period using Moodle: test control of students' academic achievement and analysis of its results. In Journal of Physics: Conference Series (Vol. 1840, No. 1, p. 012053). IOP Publishing.

Robert Morris University, (2021,4,12) Virtual Rotation. https://www.rmu.edu/academics/virtualrotation

Tanis, C. J. (2020). The seven principles of online learning: Feedback from faculty and alumni on its importance for teaching and learning. Research in Learning Technology, 28.

Yam, S., & Rossini, P. (2011). Online learning and blended learning: which is more effective? (Doctoral dissertation, Pacific Rim Real Estate Society-PPRES).

Zhu, M. (2021). Enhancing MOOC learners' skills for self-directed learning. Distance Education, 42(3), 441-460.