Fostering Digital Communities: A Case Study of a University's Digital Master Plan Designed for Networked Learning Among Online Learners

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Abstract
As online education expands, fostering digital communities that support networked learning becomes imperative. However, many universities lack comprehensive digital strategies to facilitate engagement and connections in distributed environments. This research examines the development of an inaugural digital master plan at a university where half of the student population is online. Guided by Moore's theory of interactions (1989) and Garrison's Community of Inquiry framework (2017), the plan aimed to enable meaningful student-to-content, student-to-instructor, and student-to-student interactions.

The digital master plan was designed to provide high-level guidance on the intentional and purposeful use of the educational technologies, tools, platforms, and systems necessary for a robust online learning experience. It creates a cohesive vision and strategy for the digital learning experience, just as a campus master plan aligns the physical learning spaces. The digital master plan leverages the Community of Inquiry framework as a key reference point in its comprehensive gap analysis. The collaborative process involved multiple methods to assess gaps in the university's infrastructure including: National Survey of Student Engagement (NSSE) data, three internal surveys, an external diagnostic analysis and plan, and audits of the learning management system's tools and usage. Quantitative data provided insights into student perceptions, while qualitative findings explored the depth of social relationships and learning networks enabled through digital platforms. Throughout the process, the research team aimed to understand the social learning processes that support how learners develop and utilize technology to learn and foster a sense of belonging (Garrison, 2017). The process harnesses the natural motivations underpinning social network formation - namely information sharing, support seeking, and sense of belonging. Further, it operationalizes these motivations to achieve CoI's high-order learning community goals.

Analysis revealed key gaps related to: clearly defining and measuring online student success, expanding engagement opportunities in courses, leveraging technologies to facilitate connections, building a collaborative faculty culture, and improving communication. In response, the final digital master plan put forth five recommendations focused on these priority areas. Implementation and evaluation of digital platforms aligned to the recommendations indicate positive impacts on online students' sense of connectedness, learning experience, and academic performance.

This research makes important theoretical and practical contributions by developing a replicable institutional process for assessing and strategically enhancing a digital ecosystem to foster networked learning. The digital master plan provides guidance for the adoption of social technologies and pedagogies to increase community, connectivity, and collaboration. As online education continues to expand, insights from this case study can inform strategic digital planning efforts at other universities striving to overcome transactional distance and cultivate impactful virtual learning communities.

Keywords
Digital Master Plan, Institutional Strategies, Online Learning, Teaching and Learning Ecosystem, Interaction Theory

Introduction

Higher Education industry indicators show strong growth in post-pandemic online and hybrid learning enrollment from 2021 to 2022, much of which is due to adult undergraduates (Garrett & Simunich, 2023). At the same time there has been increased demand for online learning from traditional age undergraduates, adult undergraduates, and graduate students. Not only is demand for online courses increasing, but the number and variety of higher ed

institutions willing to deliver online learning is also increasing. Potential higher ed competitors are learning fast and have prestigious names and large budgets to go with their reputations. These exigencies make it essential that many universities take a hard look at how they can continue to compete in the changing online learning landscape, as quality becomes an increasingly important factor for students as they decide which institution of higher learning is their best choice.

A 2023 Quality Matters & Eduventures Survey of Chief Online Officers entitled "Chloe 8: Student Demand Moves Higher Ed Toward a Multi-Modal Future" received survey responses from 317 university COOs (6.7% response rate). The report title gives a strong hint about the influence of the pandemic and the changing landscape of online education. "The majority of Chief Online Officers (COOs) reported strong growth in online and hybrid learning enrollments from 2021 to 2022, as contrasted with stagnant or declining in-person numbers." (Garrett & Simunich, 2023). Much of this shift is among adult undergraduates. This illustrates that, not only is demand for online courses increasing, but the number and variety of higher ed institutions willing to deliver online learning is also increasing. These factors will create more choices for students and more competition in higher education.
The idea of a digital master plan was conceived in the wake of the 2020 Covid-19 pandemic. The emergency remote teaching protocol that was in effect beginning in March 2020 forced us to rely solely on technologies such as Blackboard, our learning management system, and Zoom to engage with our students in the learning process. Through surveys administered to students in May 2020 and May 2021, we gained insights into the student experience. A common theme was that students felt a lack of connection and expressed the need for more opportunities to interact with faculty and peers. Face-to-face students were much more vocal about feeling isolated during emergency remote teaching. However, when explicitly asked about connection, online students reported feeling even less connected than our displaced face-to-face students.
The digital master plan has been created to help us take a hard look at the lessons we have learned from our pandemic stress test, make decisions about where we need to improve, and develop strategies for implementing those improvements.

Digital Master Plan

In order to address this concern, our university proposed the development of a digital master plan. The digital master plan extends the university's physical master plan to strategically improve online learning ecosystems and student success. Incorporated into our Strategic Plan in July 2021, it focuses on developing robust digital systems that facilitate meaningful student-to-content, student-instructor, and student-to-student interactions (Moore, 1989). The project was initiated when our collective experiences through the pandemic forced us to confront the reality that there is a quality gap between on-campus and online learning experiences at our university. Specifically, student survey data collected using the Community of Inquiry (CoI) survey instrument spotlighted deficiencies in key areas of engagement for online students compared to their on-campus peers (Arbaugh et al., 2008). These insights helped reinforce the plan's core focus on nurturing impactful student-student, student-instructor, and student-content interactions. The motivation behind the development of the digital master plan was to improve equity and quality across instructional modalities.

A digital master plan creates a cohesive vision and strategy for the digital learning experience, just as a campus master plan aligns the physical learning spaces. It provides high-level guidance on the intentional and purposeful use of the educational technologies, tools, platforms, and systems necessary for a robust online learning experience. Like a physical campus plan, a digital plan ensures online learning spaces, resources, and support services work together in a systematic way. It coordinates digital components so they are not disjointed or redundant. Students benefit from a unified ecosystem where the virtual learning experience is thoughtful and consistent.

In essence, the plan promotes deploying digital tools to shift one-to-many broadcast pedagogy to a community-focused model enabled through a judicious use of technological tools promoting connection and interaction. In doing so, it aspires to make once asocial learning experiences more participatory.
So while not explicitly mapped, the plan inherently bridges social network and CoI lenses - leveraging peer connectivity to realize engaged inquiry. This integration summons a cooperative, constructivist-grounded paradigm fitting for our institution's student-centered mission.

Transformational Students

While our digital teaching and learning ecosystem is meant to serve all students, it is important to recognize the differing circumstances of our online students vs. the typically younger on-campus students. Non-traditional

online students likely delayed college enrollment and are typically older than traditional age college students. They often attend part-time while working full-time, have family responsibilities, and are financially independent (Zack, 2020). This, in part, accounts for the fact that they are 2-3 times more likely than traditional college age students to leave school without completing a program or degree (Berker, Horn, & Carroll, 2003; Choy, 2002; Taniguchi & Kaufman, 2005).

A negative initial experience with college that might be seen by some as inconsequential, like the confusion of not knowing how to navigate their first Blackboard course, or not fully understanding the content in a lecture video, can trigger an intense feeling of not belonging or not being smart enough. These frustrations can seem more overwhelming for online students who don't have ready access to connections or resources available to students on-campus. This sense of inadequacy and lack of agency can trigger a powerful self-preservation instinct and cause these students to give up before things get worse (Hoggan & Browning, 2019).

Thus, the digital master plan is focused on how we, as an institution, use technology to deliver learning experiences and how students engage with those experiences. When designing online courses, our aim should be to create a transformational learning experience for students, rather than just a transactional exchange of information. We should provide scaffolding and support structures to guide online students through a meaningful educational journey that facilitates deep learning and growth.

The Teaching and Learning Ecosystem

Our university's digital teaching and learning ecosystem needs to provide educators with the means to create a student-centered, connected environment through which to purposefully integrate technologies, instructional strategies, and support structures tailored to engage students in the learning process.

We frame this discussion using Moore's (1989) "Three Interaction Types" model for distance learning, which upholds learner-to-content, learner-to-instructor, and learner-to-learner interactions as core mechanisms for facilitating understanding, achievement, and community. Students connect with the content, instructors, and each other in meaningful ways through purposeful course design. By designing learning experiences using a balance of these three interaction types we can provide structure as well as opportunities for active learning, communication, feedback, and community building in online courses.

Action Steps

The researchers took a four-step approach to a gap analysis, ultimately providing the foundation for the digital master plan. First, Student Voice surveys conducted from 2020-2022 gathered input directly from students on their needs and experiences with technology and engagement in online courses. Second, a commissioned external student engagement assessment identified targeted data-driven recommendations to embed within the university's strategic plan based on analyses of barriers and opportunities impacting learner success across modalities. Third, Teaching and Learning Ecosystem audits assessed student engagement within courses and mapped technologies that promote student interaction. Finally, Gap Analysis and Recommendations involved external consultants reviewing the previous steps and collaborating with the research team to formulate final recommendations for the digital master plan.

Step One: Student Voice

The May 2020 Post-Transition survey included basic demographic questions, Likert-scale questions designed to ascertain the perceived impact of our university's Covid-19 response on students, their perceived workload, their perception of the university's efforts to communicate with them, and their experiences with their courses. Student responses painted a pretty positive picture of the transition, which was encouraging. However, the quantitative survey questions were mostly focused on course structure and students' course-based experiences. Some open-ended questions were included. Of the open-ended questions, the responses that really captured our attention were to the following, "The changes that took place as part of the Covid-19 response were unexpected and affected everyone differently. This may have changed your working environment, your access to technology, and/or resources. Please tell us how those changes influenced your course experiences.".

The responses were both revelatory and heartbreaking. Traditional on-campus students opened up about their sense of isolation, the loss of motivation, and the impact of the loss of connection with friends and classmates on

their mental health. The stories from our online students were of a more pragmatic nature. They spoke about children at home and job-related issues. Both groups talked about the challenges of shared computers and access to the internet. What really caught our attention was the student response to the 'change' aspect of the question. As we studied the responses to this question we were struck by the underlying current of "no change" responses. When we disaggregated those responses between online students and on-campus students we discovered that 36% of our online students reported "no change", compared with only 5% of our on-campus students.

In May 2021, we conducted another survey to follow up the May 2020 survey. We broadened our focus to get a better sense of how our students were connecting with the university, faculty, and one another. To better understand the nature of learning community dynamics we administered the Community of Inquiry (CoI) survey to both online and transitioned face-to-face students (Garrison, Anderson, & Archer, 2010). The CoI survey is a quantitative instrument designed to provide insights into teaching, social, and cognitive presences based on the CoI theoretical framework for online learning. It aims to evaluate the educational experience from the learner's perspective.

The survey asked students to report how many classmates they interacted with over the course of the semester to discuss course-related activities. We specifically asked them to exclude required interactions such as discussion boards or group projects. When we parsed the responses between our online students and our on-campus students we discovered that 61% of our online students connected with none of their classmates, as opposed to only 23% of our on-campus students.

The relationship between student connections and aspects of teaching presence is surprising. Students who did not feel connected with their fellow classmates in a course also tended to report that the instructor was not engaging with them as evidenced by lower likert responses to statements such as,

- "The instructor was helpful in guiding the class towards understanding course topics in a way that helped me clarify my thinking."
- "The instructor helped to keep course participants engaged and participating in productive dialogue."
- "The instructor helped keep the course participants on task in a way that helped me to learn."
- "The instructor provided feedback in a timely fashion."

The next survey conducted in Step 1 was the National Survey of Student Engagement (NSSE), which provides valuable information on behavioral measures of student engagement. NSSE identifies 10 "Engagement Indicators" (EI) nested within four broad themes; academic challenge, learning with peers, experiences with faculty, and campus environment. EIs are summary measures based on sets of NSSE questions examining key dimensions of student engagement. We focus on learning with peers and experiences with faculty, since those areas focus on student-to-student and student-instructor interactions, respectively.
Student responses were disaggregated so that we could explore differences between our online students and on-campus students. Our data showed a disparity in those scores for both collaborative learning, with our on campus students reporting a mean of 32.5 and our online students reporting a mean of 15.4, and student-to-faculty engagement, with our on campus students reporting a mean of 28.4 and our online students reporting a mean of 15.6. These data highlight the need to implement strategies and tools that can facilitate more meaningful connections between ourselves and our online students.

The final Student Voice survey was conducted in November 2022 within a student-centered platform designed as an intervention for online students. This platform provides an online community to support virtual students' sense of belonging and was designed as a direct result of the May 2020 survey. One of the more interesting revelations in the survey showed a dichotomy between our online students feeling the same level of belonging with our on-campus students reporting 82% in agreement and 81% of our online students in agreement. However, when students were asked if they felt connected with their peers 47% of our online population agreed, compared to 70% of our on-campus students. Results on questions designed to measure the platform's efficacy showed 74% of online students using the platform felt part of the university's community, compared to only 55% of non-users. Similarly, active members reported higher rates of feeling connected to peers. While work remains to fully close the engagement gap, these metrics clearly demonstrate the platform's positive impact on fostering virtual student relationships and sense of belonging.

Step Two: External Perspective on Student Success

In 2021, we partnered with an external consultant group to adopt innovative, evidence-based initiatives to serve as a catalyst that would drive student success changes. The process began in October, 2021 and culminated in customized diagnostic analysis delivered in April 2022. The diagnostic analysis revealed three central issues: 1) uneven support for large-scale student success programs, 2) uncoordinated academic advising, and 3) ongoing equity gaps. To address these challenges, the diagnostic analysis outlines four key recommendations: First, standardize academic advising practices across colleges and departments to provide consistent guidance. Second, bolster financial aid policies to improve affordability and accessibility for all students. Third, redesign the university's course planning and review system to ensure high-quality, coordinated offerings. Finally, enhance online student outcomes by aligning resources to barriers like improving access to support services.

The implementation plan accompanying the diagnostic analysis highlights key student success challenges that we face. The plan very specifically identifies where those challenges lie, and provides clear, actionable steps to guide us through the process of addressing those challenges. Our online students are not provided with the same level of support as our on-campus students, and two, we lack real-time data to identify potential success indicators to help us understand where we need to focus our support strategies for online students.

Step Three: Teaching and Learning Ecosystem Audits

The first audit uses Fall 2021 data to categorize Blackboard courses based on how well they have incorporated interactive elements in the course design. The measure of success isn't only based on the design itself, but also on the level of actual student engagement with those elements. We accomplish this using the Blackboard's Analytics 4 Learn (A4L) diagnostics software and a modified course archetype framework, developed through a 2016 Blackboard study and described in "Patterns in Blackboard Learn Tool Use: Five Course Design Archetypes" (Whitmer, 2016).

We applied this model to our data which is presented in Table 1. The table illustrates the types and frequency of student interactions across online courses offered in Fall 2021. The first column identifies the type of activity, while the second column specifies whether the interaction is between student-to-content, student-to-student, or student-to-instructor. The next five columns display the relative frequency and distribution of the various activities based on course archetype.

Table 1: Fall 2021 Course Interactions Aligned with Course Archetypes

Fall 2021 Course Interactions	Interaction Type	Supplemental	Complementary	Holistic	Evaluative	Social
Avg Activity by Course Content	Student-to-Content	37.82	46.21	64.83	38.42	21.02
Avg Activity by Assessment	Student-to-Content	10.57	14.05	15.91	6.7	1.61
Avg Activity by Discussion	Student-to-Student	14.43	24.9	39.36	24.99	14.14
Avg Instructor Interactions	Student-to-Instructor	1,174.70	1,582.00	2,527.50	1,643.60	819.1
% Items Accessed	Student-to-Instructor	19.20%	27.00%	37.60%	29.40%	18.10%
Course Count		633	371	59	20	24
Avg Time in Course		84	105	134	91	42
Avg Activity in Course		5756	7304	9827	6260	2968

In order to meet our goals, we needed to ensure that we provide technologies in our digital teaching and learning ecosystem to facilitate student engagement. Our next step was to map our current tools in alignment to Moore's Three Types of Interaction (1989). Thus, we mapped sixteen of our tools as tools that can facilitate student-to-student, student-to-content, and student-to-instructor interactions. This allowed us to visualize gaps and opportunities within our teaching and learning ecosystem.

While these technology platforms have been adopted to facilitate student interactions and, ultimately, student success, they are also designed to make it easier for instructors to implement and manage interactive activities. Our objective, as we seek to improve the quality of our online courses, is to assure that we can provide faculty with the tools and strategies they need to easily and efficiently design and deliver engaging courses, now and in the future. It is also essential to provide a comprehensive program of training and support to educate our faculty on best practices.

Step Four: Gap Analysis and Consultant Participation

We engaged educational consultants at this critical stage. The consultants played an amplifying role - leveraging their independence and expertise to validate our internal findings, connect dots between perspectives, accentuate gaps, map to institutional ambitions, and formulate targeted recommendations customized for our distinctive needs and ecosystem. The education consultants were provided with all data from steps one through three in our exploratory process. This context formed a baseline for their plan of the engagement, which began with data review, continued with onsite interviews and the sharing of findings, and concluded with their final report. Their scope was narrow by design - centered wholly on producing actionable insights on community perceptions, technology optimization, and online student engagement.

The education consultants found that despite a strong culture of ensuring student success and high student engagement with the institution, there are opportunities to expand student engagement using both technical and structural improvements to the student and faculty experience. Their preliminary findings and recommendations were incorporated into our digital master plan recommendations.

Recommendations

The education consultants preliminary findings and recommendations were incorporated into our digital master plan recommendations.

Recommendation 1: Defining and Measuring Student Success

This recommendation focuses on the need for an agreed upon set of specific, realistic, and quantifiable leading measures for student success among the university's stakeholders and a way to track progress on those measures in real time.

The consultants asked all their interviewees to define student success at our university. The common thread among respondents was "distilled down to persistence and timely completion of a program of study." Gainful employment was also a mentioned success metric but the consultants suggest that it is "notoriously difficult to assess and it is out of the direct control of the institution. Student retention/persistence and successful program completion are both metrics which can be measured and we have a good set of data with which to derive pertinent sub-metrics to find useful correlations with desired success outcomes."

This need for data-informed strategies has been put in high relief as a result of the recommendations made in the diagnostic analysis and plan. It is also clear that meaningful, relevant, and readily accessible data is necessary to measure progress on all the recommended strategies.

Recommendation 2: Expand Student Engagement Opportunities Within Courses

We require more consistency in online course design and delivery to expand student engagement opportunities. As evidenced by our findings, online education is in flux. Demand is increasing along with the demand for quality. However, many activities that take place inside and outside the classroom are often overlooked because they happen organically and, often out of our sight and without our knowledge. Our online students lack the means and opportunities to participate in these activities on their own. It therefore becomes our responsibility to intentionally design these activities into the structure of a course.

In the teaching and learning audits, we analyzed the relationship between course design, as represented by Blackboard's archetypes, and student engagement with their courses. The results of that analysis support the disparity in student success depending on course design. Data from the NSSE survey conducted in Step One - "Student Voice" - reveals gaps in course design and delivery between online and on-campus courses. The survey shows significantly fewer opportunities in online courses for collaborative learning through student-to-student and student-instructor interactions, both within formal course activities and informal out-of-class engagements. These results highlight the need to facilitate more occasions for students and faculty to connect and engage, both formally and casually, in the online environment. By improving opportunities for collaboration and interaction, we can enhance the online learning experience.

One way we will implement this recommendation is through rubric-based templates that show how to intentionally design three types of interaction in online courses. These templates will allow for variations in the balance of interactions based on course structure and teaching style. Recent developments in generative AI, including those integrated into the Blackboard Ultra platform, assist instructors and instructional designers in aligning interactive activities with course outcomes and generating course modules. These course design aspects will alleviate the most time-consuming part of course development.

Recommendation 3: Expand Student Engagement Opportunities Based on Special Interests

Recommendation 3 aims to ensure the teaching and learning ecosystem provides ample opportunities for student-to-faculty and student-to-student interactions inside and outside of courses. As a result of the May 2020 post-pandemic survey was the creation of a student-centric social platform. Our online learners showed great enthusiasm for the community and quickly reached out to one another. Some students reached out to others just to connect while others asked for advice. By Fall semester 2022 there were more than 800 students active each month and in a 2022 survey were able to determine that students who participated in the platform felt significantly more connected to our university than students who didn't participate.

The success of this student community highlights the need for members of our online student community to connect and interact with one another inside and outside of specific course-related work. Many of the comments from our online students when the platform was first introduced spoke to not only the need for the community, but also gratitude that the university had intentionally created it for our students.

> Wow! I hope this gets off the ground and becomes "a thing"! It is definitely needed, I believe, for we virtual and/or non-traditional students to connect, feel included.... I'm a non-Facebook person but want some connecting with fellow students. I'm 50-something, returning to school after I raised my kids to adulthood. Each of us at [this university] is unique and in unique seasons of life. Thanks to the team that put this together! It takes time for a resource such as T2T to take flight, so be patient and thanks again!

This quote is representative of so many of our online students. We can't assume they, unlike our on-campus students, will connect with one another on their own. It takes effort and risk. Therefore, we need to embrace our responsibility, as a university community, to provide our online students with multiple channels through which they can connect with one another. While this recommendation's current focus is on connections within courses, we must also think more broadly about how projects like this platform can be used to connect our students outside the virtual classroom.

Recommendation 4: Create a Faculty Culture of Peer Learning

We recognize the need to create a culture of peer learning to support faculty adoption of educational technology that supports Moore's Three Types of Interaction. Although we have paid considerable attention to the digital teaching and learning ecosystem as it relates to students, it is essential to acknowledge that instructors have not been immune from feelings of disorientation and loss of control as the pandemic forced them to view teaching and learning from a different perspective.

Data from the strategy consultants reveals a widespread fatigue among faculty and staff when it comes to embracing new technology. This needs to be accounted for in adoption strategies for any new initiatives we undertake. One effective approach to combat this is to foster a culture that values data (Recommendation 1) and to develop a comprehensive communication plan that clearly communicates the rationale behind any proposed

changes to the university's community (Recommendation 5). Additionally, it is vital to ensure that our implementation strategies are designed to simplify and streamline existing processes.

In the consultant's interviews with faculty, the consultants conclude that "Faculty here are not negative toward educational technology and innovation. Instead, they feel they don't have the time to invest in innovation, and the multiple options regarding applications and tools is intimidating." They also observed that adjunct faculty "wish for a peer mentor who could answer quick questions and show how best to use specific tools in a specific discipline or department".

Their suggestion is that we should establish a culture centered around peer learning. They provide various instances of peer-to-peer support. Another potential approach to fostering this culture would be to develop a community, akin to the student-oriented platform, that would facilitate a faculty-focused learning community integrated within our LMS, Blackboard. Its purpose would be for faculty members to exchange best practices regarding educational tools and pedagogies. Moreover, it would serve as a platform for our teaching and learning center to share resources, such as the syllabus template and inclusive teaching practices. Additional resources are currently being developed to support the implementation of Moore's three types of interaction in existing courses.

Recommendation 5: Improve and Refine Institutional Communication Processes and Channels

Lastly, we aim to facilitate a comprehensive communication plan to support the university-wide culture shift that embraces the recommendations of the digital master plan. According to the strategy consultants, "by far the most common theme uncovered in our work at your university is confusion regarding communications processes and channels. This confusion was expressed by students, faculty, and staff. This finding goes beyond the purview of our report; however, it is important to address here as it relates to many of our recommendations."

As is common in so many complex organizations, improving communications at all levels and across all stakeholders is foundational for organizational growth and success. There is no more important success component to change management than improving communications. In order to facilitate this shift it is essential for us to develop a coherent and consistent vision for student success, have a shared understanding of what student success means for the university community, and the ability to measure the progress of our university's student success initiatives.

The diagnostic analysis and plan emphasized the importance of communication strategies. Transformative change is never easy. It requires coordination and, at times, sacrifice across multiple units. It is also important to be able to communicate that these are not separate and distinct strategy streams, but are all interrelated.

Conclusion

The digital master plan extends the university's physical master plan to strategically improve online learning ecosystems and student success. Motivated by pandemic-driven awareness of disparities between modalities, the plan focuses on developing robust digital systems facilitating meaningful student interactions. This project addresses the unique needs of virtual learners.

The plan embeds CoI principles into its articulation of institutional needs and desired capabilities at a broad level. It provides directional guidance to inform critical investments and initiatives. But turning these recommendations into reality will require alignment with the university strategic plan and other ongoing initiatives as well as extensive requirements gathering, budgeting, and multi-stakeholder decision making.

In summary, developing a digital master plan allows an institution to take a strategic, data-driven approach to crafting an exceptional and equitable online learning environment for students. Other universities would benefit from adopting a similar institutional planning process.

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