

User Designed Inquiry: An effort to reconceptualize teaching and learning at a US university

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Abstract

This paper explores the adoption of a user-designed curriculum at a medium-sized research, residential university in the US. Two cases of faculty in health and engineering engaged in pedagogical changes towards a user-designed environment are explored. Insights generated include the need to leverage existing good practice while setting clear institutional goals for what constitutes innovation, need for student input in process of shifting pedagogical approach, and diversity of size/discipline contexts in which user-designed courses can operate. The features and challenges associated with user designed inquiry are discussed in light of these initial efforts.

Keywords: *Universal Design for Learning; Competency Based Education; Backwards Design; User-designed Inquiry*

1. Introduction

Higher education is beset with an array of problems as it confronts the destabilization by market-forces, disruption from alternative providers, and deteriorating public trust in the institutional sector, particularly in the United States (Vyolaris, 2023). Illustrative of the shift in markets and market-providers, IBM recently announced a plan to train 2 million learners over the next three years in AI, with a focus in underrepresented communities, all at no cost to the students (Fore, 2023). And in response, higher education is ill-suited to quickly adapting to this changing landscape, with numerous and overlapping committee structures, faculty governance related to policy and process changes and a tendency toward maintenance of the status quo.

There are certainly outlier institutions that are comparably more nimble in responding to market-changes, particularly the need to maintain and increase enrollments. Arizona State University has taken up residence in Los Angeles, Carnegie Mellon University moved into Silicon Valley over twenty years ago and recently Hawai'i Pacific University moved into Las Vegas, as a few illustrations of substantial institutional change. Too, a cadre of non-traditional institutions have arrived on the national scene in the past 15 years and have rapidly increased their market-share

of students, including Western Governors University, Southern New Hampshire University, Purdue University Global and the University of Maryland Global Campus. Some of these have been added onto existing institutions while others are startups or foundationally reorganized institutions (such as SNHU) that are unrecognizable from their previous iterations. Yet these are newsworthy because they are so atypical, as most institutions remain locked into a geographic footprint and mindset.

In addition to the external threats, the internal ones are equally problematic. The uneven quality of university-based pedagogical practices is widely known, though now receiving greater scrutiny after the COVID-19 pandemic. The pandemic forced most residential institutions into fully online instruction for an extended period of 1.5 to 2 years, which resulted in the unintended consequence of having courses brought into the homes of students and under the peering eyes of tuition-paying parents. Parents, witnessing the repetitive droning of lectures to blackened zoom boxes in a less-than-ideal situation of compulsory online teaching added to the already diminishing trust of the public in higher education. Too, the complications of having to navigate computer access and quiet space to work with siblings and other family members was cited by students as having a deleterious effect on their academic progress, and thus, their motivation (Means, 2020). In a sense, the pandemic exposed what is widely known within the higher education sector; that the core business is often overlooked, operating in a *set-it-and-forget-it* mode driven by institutional efficiency rather than the quality of user/student experience.

Despite an industry tendency to under-attend to core work, the importance of instructional practice and classroom climate cannot be overstated. A study of nearly 23,000 students in community colleges in California participating in courses such as mathematics, reveals that “clear explanations of the grading process, precise guidelines on the accommodations made for late work, explicit encouragement for students to seek help and guidance on where to find support, and fostering student belonging through collaboration with peers and demonstrated support and reassurance by faculty members” were not consistently in place in these critical, gateway courses (Blake, 2023, *Fostering Belonging*, para. 1). This absence has led to significant failing/withdrawal rates, undercutting much heralded institutional goals to promote equitable access.

2. Lehigh University Commits to Pedagogical Change

The macro-shifts in markets and subsequent changes in academic programs provide a context for our work, though our focus is on the internal workings of the core business of our university; namely, teaching and learning. Lehigh University recently adopted a new decade-length strategic plan called *Our Future, Our Lehigh*, which includes a significant investment in redesigning its pedagogical practices across all academic and student-facing units. Lehigh is a research-intensive, residential university of approximately 7,000 students, roughly 5,000 of

whom are undergraduates, that has diverse academic programs organized into five colleges: engineering, arts and sciences, business, health and education. The strategic plan emerged from a one-year self-study wherein many faculty, staff, students and leaders noted a yawning gap between the expectations of flexibility and personalization in courses and the reality of rigidity and compliance that pervades the educational program at Lehigh, not unlike most of its peer-institutions in the US.

2.1. Five Part Model of Lehigh’s User Designed Inquiry (LUDI)

We introduce the concept of *User Designed Inquiry* to build a student-centered, inquiry-driven, and competency-based learning environment. Our approach is anchored in the following areas: (1) universal design for learning (UDL), (2) competency-based education (CBE), (3) backward design (BD), (4) innovative approaches to assessment and instruction (3rd wave tech, e.g., AI, VR/cobotics), and (5) redesigning internal research capacity for evaluating instructional effectiveness. This initiative recognizes that no singular intervention will move Lehigh from good to great with regard to teaching, but rather that an intentional approach that blends a student-oriented and user-designed curriculum, is needed (Supiano, 2023). Too, iteration is built into our design concept as we create an internal data analysis shop that will provide continuous, rapid and specific data referencing student performance--not student perception--as a centerpiece of the reconceptual effort.

Universal Design for Learning (UDL) is an educational approach designed for learners' diverse needs, interests, and experiences by providing multiple means of engagement, representation, and action and expression (Hitchcock et al., 2002; CAST, 2018). It serves as the foundation of our UDI model, upon which the other two pedagogical concepts are built. According to UDL, there is no “standard learner” (Gronseth, et al., 2020), as learners' neural networks are unique (CAST, 2018), and learners vary in their learning processes. The Center for Applied Special Technology (CAST) developed the three core principles of UDL in 2018: provision of 1) multiple means of engagement, 2) multiple means of representation, and 3) multiple means of action and expression. UDL emphasizes fostering effective networks and recruiting interest by offering individual choice, relevance, and authenticity while minimizing learning threats and distractions. UDL suggests strategies to sustain effort and persistence, such as highlighting goals and objectives, varying demands and resources, and promoting collaboration and community. The ultimate goal of UDL is to develop expert learners who are purposeful, motivated, resourceful, knowledgeable, strategic and goal-directed—all of these layered into the experience of learning such that the executive function skills are critical takeaways to promote continuous learning.

Competency-Based Education (CBE) aligns seamlessly with UDL, emphasizing the mastery of specific, well-defined competencies as the primary goal of education. CBE focuses on clearly defined learning objectives, creating different ways of demonstrating that performance, and

builds connectivity between students' tacit knowledge and the academic learning of a course while measuring performance outcomes. Compared with traditional education, CBE focuses on measuring the learning outcomes and addressing fundamental shortcomings of the traditional model (Gruppen et al, 2016). CBE emphasizes the mastery of skills and abilities, rather than fixed learning time, by promoting learner-centeredness while ensuring that all students succeed. It serves as a gateway to UDL by providing a framework in which student agency and choice are aligned with specific learning goals. This allows for greater alignment between the content being taught and the needs and interests of individual learners.

Backward design (BD) serves as the assessment structure behind this integrated model. It is a pedagogical framework that complements both UDL and CBE by emphasizing the importance of starting with the *end-in-view* and designing a curriculum and learning toward those ends. In BD, educators begin by identifying the desired learning outcomes or goals they want students to achieve (Wiggins and McTighe, 2005). They then work backwards to determine the most effective instructional strategies and assessments that will support those goals. By starting with a clear understanding of the desired learning outcomes, educators can ensure that their instruction is focused and intentional. This approach helps create a coherent and meaningful learning experience for students, ensuring that their learning is relevant and connected to real-world applications.

In *User Designed Inquiry*, UDL, CBE, and BD create a synergistic ecosystem that fundamentally shifts the way that Lehigh faculty approach their course development and instructional practice. UDL ensures that the learning environment is accessible, engaging, and responsive to diverse learners. CBE ensures mastery of meaningful knowledge relevant to individual learners and course domains while BD maintains strategic alignment between learning outcomes, competencies, activities and assessments. Innovative approaches to assessment and instruction embedded in this system offer a range of immersive learning experiences like collaborative activities, technology-augmented activity, and experiential applications that enrich the learning environment.

We collaborate with faculty from different colleges to integrate the *User Designed Inquiry* (UDI) model into curriculum redesign and instructional practice. We evaluated the current curriculum design based on their departmental expectations and assisted faculty in redesigning their syllabi, class activities, and performance assessments towards providing learners with a more inclusive learning environment, increasing their engagement in learning, while orienting them to real-world applications with learning competencies that have applicability beyond academia.

2.2. Two Cases for Implementation of Lehigh User Designed Inquiry (LUDI)

We explore how the practice of two faculty members, in different stages of their professorship, have benefited from adopting LUDI in the 2022-23 academic year. The first case is of a junior faculty teaching a cross-listed course with students ranging from freshman to senior engineering students, and therefore with substantial differences in academic and professional behaviors, skills, and knowledge. The second case is about a teaching faculty with extensive experience in a related industry who organically implemented UDL principles in an introductory seminar class with over two hundred students. Both cases incorporate different types of technology to address student engagement and establish trustworthy ways for each learner to communicate with and request assistance from their professors.

2.2.1. Public Health Course

One of our cases is from a graduate-level public health course with 10 students. Certain issues permeated the faculty's desire to redesign her course, including the need for a hybrid format, addressing flagging student engagement, and a lack of student grasp for course expectations. Following the BD process, we assisted the faculty member in identifying desired results for this course reconceptualization, finding what knowledge and competencies learners should master and take-away following the course.

The faculty first connected different competencies with learning outcomes and related objectives, while articulating acceptable evidence of mastery. At this stage, we encouraged her to allow learners to express their understanding in multiple ways, including using an online, asynch wiki program, concept maps, reading alternatives, and multi-modal presentation formats. Learners were encouraged to choose a learning pathway that best fits their aptitude and experience while gaining insights about how to understand their metacognition. Last, the faculty member included multiple ways of introducing and connecting knowledge through inquiry-based, problem-based learning, which led to perceived increases in student engagement on the part of the faculty member. After this revised course launched, we observed the class, interviewed students, and continually met with this faculty to make minor revisions. At the end of the semester, this course received positive feedback and comments; a lot of students mentioned the flexibility of choosing readings and ways to present their understanding. They reported that this approach helps them understand the content and demonstrate a learning competency through performance assessments.

2.2.2. Computer Engineering

The other case is from the computer science and engineering department. A faculty member in this case provides a foundational, introductory course in computer engineering to over 200 first-year students. Different from the previous case, this faculty has applied UDI naturalistically rather than with intention. The faculty recognized that some students came with advanced

computer programming skills and/or Advanced Placement credit in computer science from secondary school. He engaged learners in a self-assessment of their capacity and allowed them to choose a learning group based on previous experience with computer science. He also invites students to switch groups freely based on their preference during the semester, thereby accelerating or decelerating their learning through assessment and performance data. By continuously adapting feedback from learners, he optimizes the course with personalized assessments calibrated to their prior learning, improving their engagement with the course and their learning outcomes.

While we collaborated with him, we assisted this faculty with integrating different competencies into this course and making the course better support learners' personal development for career and academic development. While this work is still in progress, as we are now developing a competency model for his course. This competency model not only would include technical skills and workplace expected behaviors, but it would also list personal skills and collaboration skills as important competencies to be developed throughout the delivery of their course.

3. Insights and Implications for LUDI

Our proposal aims to foster User Designed Inquiry (UDI) through continued professional development of faculty in a discursive environment. Lehigh faculty are given an array of resources, including 1:1 coaching, observation/feedback sessions, online asynchronous learning in our UDL/CBE/BD flip book, bi-monthly on campus meetings and special events/conferences designed to illuminate the pedagogical concepts along with opportunities to make curricular and instructional changes. In designing the Lehigh UDI learning environment for faculty and staff, we explicitly acknowledge principles of user-design and universal design to create multiple portals and pathways for faculty-as-students. This has led to over 100 faculty and staff participating in the socializing discourse over the first 6 months of our LUDI plan implementation.

Certain insights are offered in terms of the two cases in this paper—health and engineering, namely. First, the reconceptualization work was introduced in the case of the health faculty but already present with the engineering faculty member. This is an essential piece such that those engaging in a related pedagogical reform effort need to make space for existing practices that resonate with a chosen model while also setting a clear standard for what shift is desired. Assuming that ‘nothing is happening’ can demoralize those who are already making a substantial effort, even when they do not label that effort using recognized pedagogical theory. Too, the effort to be innovative in university education too often has an ‘anything goes’ quality, such that the term *innovation* itself is a vapid proxy for an ambiguous, if inarticulate, difference. Rather, making a break with the traditions of institutionally driven pedagogical practice towards user-focused design offers a clear path for the kinds of teaching and learning that we believe is

innovative, as it fundamentally alters the learning environment and recognizes the sovereignty of the learner in this new relationship.

Second, in both cases, the inputs of students and their subsequent behaviors and activities both before the reconceptualization and during/after, are crucial datapoints that also need attention. Both faculty made adjustments at all stages of implementation and remain in a continuous process of development for these courses and in their teaching. That this is a journey is obvious from their work and it thus requires sustained attention and a supportive context to allow for the experimentation that inheres within this approach to reach fruition. Students were not uniformly supportive of the LUDI changes when they first began the course, for example. They had adopted a passivity in their learning through their work at Lehigh to date and carried this dyadic, teacher-focused expectation into the reconceptualized course. Attention and support for learners in this context is also important as they too are experiencing a shift in the traditional learning environment, albeit one that centers on their learning and development rather than institutional efficiency.

Third and finally, the two courses present a range of participants, from 10 in health to over 200 in engineering. That the work was carried out in these varied environments speaks both to the value that it adds to a learning environment but also to the applicability across classroom type. Many faculty will hear ‘user-designed’ and assume that course sizes must be dramatically reduced to make such changes. This is not true. Even in large learning environments, such as courses in the hundreds of students, choice of motivation, engagement and performance can be introduced while smaller, collaborative groups—as was orchestrated in the computer engineering course—can be organized. Just as UDL prescribes that there is no one-size-fits-all curriculum, there are a myriad of venues and means by which a user-designed curriculum can take root if that is the intention of the faculty.

The challenges associated with the shift to a user designed inquiry model are manifold, though a few are of immediate concern. First, the user-focus is somewhat at odds with a teacher-centric model such that some faculty will position this change as a threat to their expertise and pedagogical orientation. That they are not being called upon to ‘give students knowledge’--a deeply held belief among many faculty that is foundationally flawed--is seen as a threat to their sense of purpose. Too, the expectation that this pedagogical shift creates more work for faculty is real and one that we attempt to alleviate by offloading some of the course revision and implementation work. Yet, we also see the work of changing practice is not limited to documents, syllabi and course outlines, but must be lived and experienced by the pedagogue. Thus, user designed inquiry does require work, though the intellectual work of changing how faculty see themselves and their purpose is really the essence of this change. Lastly, detractors to this approach have asserted their demand for proof that user designed inquiry is better than traditional teaching and learning. The literature, some featured herein, suggests otherwise as moves to invite student engagement, choice and agency lead to improved performance. And yet

the demand for ‘local proof’ remains, a task that we are reorienting towards in next year’s iteration of user designed inquiry.

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