

Center for teaching and learning websites as online faculty development: A framework

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Abstract

Center for teaching and learning (CTL) websites help communicate information, services, and opportunities to institutional stakeholders while also serving as an institutional brand to external audiences. Thus, CTL websites must strike a balance of being publicly accessible and user-friendly while also providing various support, resources, and pathways tailored to faculty needs and development. Still, faculty attendance at and participation in CTL-supported faculty development programs and initiatives are persistent and pervasive challenges in higher education. Faculty have many competing priorities and may lack the necessary incentives or time needed to engage with such development opportunities, especially in in-person settings. CTLs are increasingly turning to online faculty development to provide faculty with access to professional development offerings anytime, anywhere. However, few, if any, studies focus on the CTL website as a form of online faculty development in and of itself. The purpose of this single-instrument case study was to shed light on CTL websites as a medium for online faculty development. Data were collected using Google Analytics and through heuristic evaluation and moderated remote usability tests with purposive samples of faculty from varying disciplines and higher education institutions. The case explored provided insights into website design, user experiences, and the information architecture of one CTL website. Findings and lessons learned are discussed, and a framework

for online faculty development via CTL websites is theorized. Newly formed or existing CTLs may find value in the results.

Keywords: center for teaching and learning, online faculty development, higher education

Higher education faculty are often hired as content experts with little to no formal training in teaching (Lowenthal, 2008; Serow et al., 2002; Van Waes et al., 2015). To address this problem, higher education institutions have increasingly created centers for teaching and learning (CTLs) to help teach faculty how to teach (Cruz et al., 2020). CTLs advance teaching quality by facilitating faculty development programs and initiatives that range from hour-long workshops to semester- or year-long communities of practice (Hines, 2017; Wright, Horii, et al., 2018). Still, faculty are busy, and their competing priorities often limit their attendance at and participation in CTL-derived faculty development (Lowenthal et al., 2013). Given this dilemma, CTLs have increasingly tried curating and creating online resources and online forms of faculty development to support, among other things, just-in-time learning (Forde & Carpenter, 2020). However, over time CTL websites can become a mess, a junk drawer, which can make it hard for faculty to find the information they seek (Dotson & Bernstein, 2010; Green & Little, 2017; Sipes et al., 2020).

CTL websites differ from other university websites in that they are designed to support the teaching and professional development of faculty members through a focused and tailored user experience (see Cruz et al., 2020; Wright, Horii, et al., 2018). Other university websites focus more broadly on university life (e.g., admission, student services, tuition), and the content on these websites is less targeted to faculty needs (see Astani & Elhindi, 2008; Meyer & Jones, 2011; Saichae & Morphew, 2014). Furthermore, CTL websites may seamlessly integrate with other university systems (e.g., learning management systems, faculty evaluation systems) to achieve faculty development aims, whereas other university websites do not use or require this level of integration (see Elçi et al., 2019; McCullough & Buch, 2020). In this sense, CTL

websites are more than static presentations of information; they are dynamic and must be updated continuously (see Hoffmann-Longtin et al., 2014; Lieberman, 2018; Sonnino et al., 2013).

Much of the literature on the design and information architecture of higher education websites stems from the study of academic libraries and institutional websites in their entirety (see Okhovati et al., 2017; Singla & Aggarwal, 2020; Yoon et al., 2016). Research suggests that the design of higher education websites influences usability, user satisfaction, and return visits (Fuller & Hinegardner, 2001; Gullikson et al., 1999; Massanelli et al., 2021). CTL websites are no exception; the design is an essential form of communication to the faculty they serve. Faculty need to find the website easy to use so that return visits, self-directed learning, and working relationships continue to grow.

CTL websites are cost-effective communication tools that leverage existing campus resources and expertise, but their design poses persistent challenges for CTL staff who may not be experts in web authoring, information architecture, or search engine optimization (see Hoffmann-Longtin et al., 2014; Truong et al., 2016). Despite their growing use as a tool for online faculty development, there is a lack of research specifically focused on the design of CTL websites (see Colby et al., 2022; Herman, 2012; Martin et al., 2019; Sweet et al., 2017). CTL websites have the potential to serve as portals connecting faculty to colleagues both locally and abroad and to provide opportunities for self-directed learning, anytime and anywhere delivery of resources, ease of access to just-in-time information, and collaborations among faculty and developers (Shea et al., 2002). However, more research is needed to better understand how CTL websites function as a means of online faculty development on their own. To address this gap, we conducted a qualitative case study to understand how the design of a CTL website impacts its end users. In the following article, we present our lessons learned from studying the case and present a framework for CTL websites as online faculty development.

Methodology

Researchers conduct an instrumental case study to gain insights about a phenomenon of interest (Creswell & Poth, 2018; Stake, 1995, 2000). In the current study, our phenomenon of interest was CTL websites as a medium for online faculty development. We identified the University of Maryland, Baltimore (UMB) Faculty Center for Teaching and Learning (FCTL) website to study as our typical case. We conducted usability tests and expert evaluations to explore user experiences (Nielsen, 2012). Additionally, we conducted a retrospective analysis of the FCTL website activity using Google Analytics during the data collection period to shed light on (in)consistencies and opportunities for deeper insight of the phenomenon (Patton, 1999). We elaborate on the data collection and case context in subsequent sections.

Data Collection

Data were captured within a six-month period from July 1, 2021, to December 31, 2021, in accordance with the Institutional Review Board (IRB) #HP-00094457 and research design. Data collection occurred in three phases, the first two ran concurrently: (1) moderated remote usability tests, (2) heuristic evaluation survey (Maier & Eckert, 2018; Moran, 2019b; Nielsen, 1994, 2012, 2024; Nielsen & Molich, 1990), and (3) Google Analytics. Moderated remote usability tests involved evaluators completing a series of routine tasks during a virtual session with a moderator; the session was recorded and analyzed to identify potential areas for improvement to the website (Mesa, 2013; Moran, 2019b; Moran & Pernice, 2020). Heuristic evaluation involved evaluators examining the website interface and judging its compliance with recognized usability principles (Nielsen, 1994; Nielsen & Molich, 1990) as well as the websites' pedagogical efficacy and social dynamics (see Benson et al., 2002; Gallant et al., 2007; Mehlenbacher et al., 2005). Google Analytics was used to track and report website traffic and user behaviors (e.g., page views, average time on page, devices used) (see

Marin et al., 2022; Rhode et al., 2015; Schoening & Oliver, 2016). We elaborate on each of these phases in the subsequent sections.

Phase 1: Moderated Remote Usability Tests

One researcher served as the usability tester in charge of recruiting a representative sample of faculty to serve as potential participants. The test administrator sent emails to participants informing them of the test logistics and providing them with the informed consent procedure. When participants voluntarily agreed to participate, the test administrator requested their availability and conducted the test at the appropriate and mutually agreed-upon date and time. Two participants who were not familiar with the FCTL website or activities completed moderated remote usability tests and were selected based on their representativeness of faculty rank, discipline, education, and age at the university. The non-probability sampling procedure provided different perspectives of typical case end users within the data collection period. Each remote usability test was conducted and recorded using Zoom video conferencing software and lasted approximately 21 minutes. During the session, the test administrator explained the procedure, encouraged participants to think aloud, and asked the participants to complete four tasks based on hypothetical scenarios:

- Task #1: Find Consultations. Scenario: You have some questions about revisions you would like to make to one of your online courses. How would you go about scheduling a consultation to talk about your course?
- Task #2: Find Workshops. Scenario: Where would you find information about workshops the center is offering for faculty?
- Task #3: Find Course Design/Development. Scenario: You have been tasked with developing an online course and would like to learn more about what that process entails. Can you find this information on our website?

- Task #4: Find a Specific Resource. Scenario: You would like to improve a course you quickly transitioned from face-to-face to online to ensure it reflects best practices in online learning. Where might you find information to help you do this?

After the completion of all four tasks, the test administrator asked the participants what they liked the most and least and their recommendations for improving the website. The test administrator also used open retrospective probing to evoke the participants' experiences with task completion. Tasks 1 and 2 were designed to elicit the potential of this website to serve as an entryway for a typical faculty member to access professional development opportunities (see Colby et al., 2022; Shea et al., 2002). Tasks 3 and 4 were designed to elicit the potential of this website to serve as a medium for online professional development whereby a typical faculty member could self-direct their learning (see Herman, 2012; Shea et al., 2002).

Phase 2: Heuristic Evaluation Survey

A 20-item heuristic was developed to evaluate the efficacy of the website as a medium for online faculty development (see Appendix A). The heuristic consisted of six general web design items, seven teaching and learning items, and seven communication and information items (see Benson et al., 2002; Gallant et al., 2007; Mehlenbacher et al., 2005; Nielsen, 1994, 2024). The six general web design items were selected to evaluate the websites' usability (see Nielsen, 1994). The seven teaching and learning items were selected to evaluate the pedagogical efficacy of the websites' design (see Benson et al., 2002; Mehlenbacher et al., 2005). The seven communication and information items were selected and developed to evaluate the websites' social dynamics (see Gallant et al., 2007; Mehlenbacher et al., 2005).

The heuristic, as a Qualtrics electronic survey, was emailed to a purposive sample of four expert evaluators who were external to the university. The evaluators were selected based on their publicly available

CVs that listed their appointments as faculty or senior academic leaders in higher education institutions and because their work history demonstrated experience directing or developing CTLs, marketing CTL activities, and/or designing CTL websites and user experiences. Evaluators rated each item on a 5-point severity scale of usability: 0 (*not an issue*), 1 (*cosmetic*), 2 (*minor issue*), 3 (*major issue*), or 4 (*catastrophic issue*). Evaluators also provided open-ended responses to likes, dislikes, and recommendations for website improvement. Each heuristic evaluation took evaluators 22 minutes to complete on average. Three of the four evaluators had never visited the FCTL website prior to completing their evaluations.

Phase 3: Google Analytics

After completing the first two phases, we used Google Analytics to investigate the performance of the website over the six-month data collection period (Appendix B). Google Analytics enabled us to identify:

- What pages are most popular on the site?
- How long do site visitors view a page on average?
- What devices are they using to access the site?

This provided a general sense of website activity and was used to determine whether certain pages, time on page, or devices might inform professional development activities occurring on this CTL website.

Data from all phases were analyzed for themes and patterns to shed light on complementary aspects of the same phenomenon. Triangulation, in this sense, was used to ensure that our account was rich, well developed, and facilitated a deeper understanding of the phenomenon. The account of our analysis of these multiple data sources was made to enhance the trustworthiness of our study as suggested by Lincoln and Guba (1985). Of additional significance to the present

study is that the researchers espoused a pragmatic constructivist worldview in their analysis and held several meetings to discuss the findings and lessons learned to better understand multiple ways of seeing the data.

The impetus for this study came from the primary researchers' interest in online faculty development and a desire to better understand how CTL websites might inherently function as professional development of this kind. The researchers involved in this study had several years of combined experience in CTL development, faculty development, online teaching and learning, and website design. Our inquiry began with a need for general understanding (Stake, 1995), recognizing that an instrumental case study "may be an object of study as well as a product of the inquiry" (Creswell & Poth, 2018, p. 98).

The Case Context

The FCTL website—that is, the instrumental case—is hosted as a sub-page to the main UMB website. UMB is a research-driven university of seven schools: Medicine, Law, Dentistry, Pharmacy, Nursing, Social Work, and an interdisciplinary Graduate School. In Fall 2021, the university employed 3,123 faculty, 2,637 executives/professionals, and 1,302 support personnel who either taught or supported professional or graduate courses for 6,314 students.

The Faculty Center for Teaching and Learning

In an effort to create more opportunities for faculty development, the university created the FCTL in 2019. The FCTL supports faculty in the execution of their roles through curating, creating, and collaborating on educational and professional development resources that reflect the unique interests of faculty at the institution. The center provides various services included but not limited to instructional design, multimedia production, assessment and evaluation tools, teaching

workshops and consultations, and course design and serves as a hub for graduate teaching assistants and faculty learning communities.

In 2019, center staff included an executive director, four instructional designers, one media specialist, and one faculty liaison who were tasked with the development of the FCTL website (<https://www.umaryland.edu/fctl>) to coincide with the announcement of the center to the UMB community in Spring 2020. FCTL staff developed their website content using the institutions' web content management system (WCMS), Terminal Four (T4). T4 allows university communication departments the ability to centralize web development across an institution through various roles, permissions, and templates.

Web Content Management System

A centralized WCMS is used to ensure a consistent look and feel (i.e., branding), improve accessibility, and ensure that web governance rules and workflows are followed (Bailie & Urbina, 2013; Barker, 2016; Lynch & Horton, 2016). Individual departments and centers are in charge of managing their web content and making creative design decisions.

Figure 1 details the FCTL design space that was confined between the institutional header and footer and to predetermined content types (e.g., general, three-column, slideshow, video gallery). A full list of the available content types is provided at the UMB Website Manual (<https://www.umaryland.edu/cpa/website-manual/content-types/>). The content was placed on the website using the T4 WYSIWYG editor and included text, images, hyperlinks, and videos.

Information Architecture

Before developing the current version of the FCTL website, we conducted an environmental scan of 40 different CTL websites. We found that these websites often organized their content in similar ways (e.g., using similar link texts; see Appendix C). Based on our scan, we

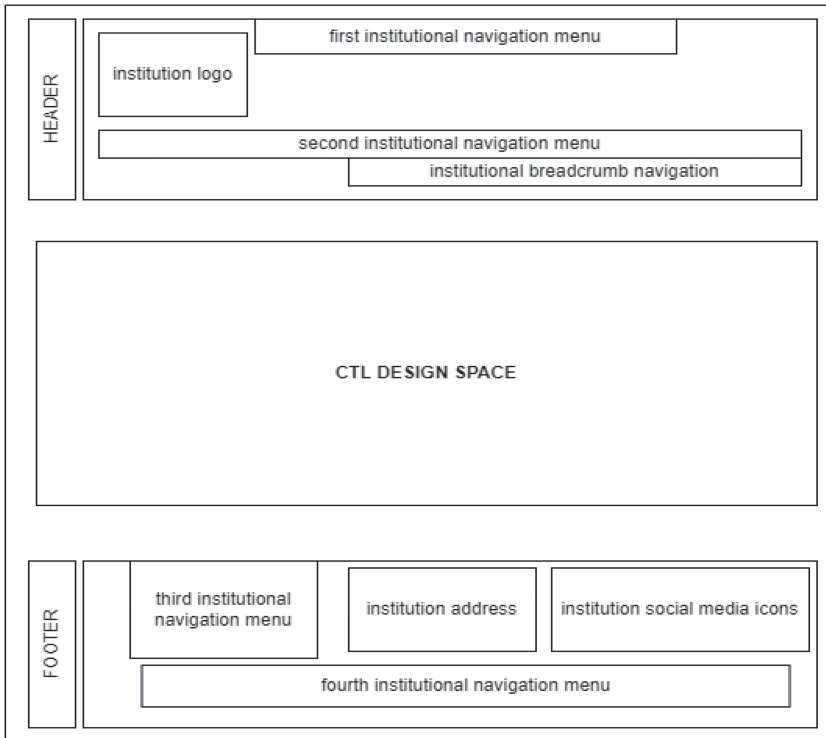


Figure 1. CTL Design Space

decided to structure the FCTL website using five content categories: About, Programs, Services, Resources, and Events.

Website Launch

In conjunction with the initial launch of the FCTL website, the center surveyed UMB faculty, staff, and students for their CTL website preferences (e.g., desired services, programs, resources, and information to include). The survey did not receive sufficient responses to acutely inform the website design and development as the responses were not statistically significant to represent the entirety of the UMB community. However, according to the executive director, the findings

provided some general insight as to what the FCTL might include and what to avoid.

Establishing web presence was paramount to first impressions of the CTL. The CTL website contributes to the UMB mission, addresses strategic objectives, provides a place for institutional stakeholders to learn more about the center, and initiates new working relationships across campus. After launching the website, staff members sought to explore the FCTL website as a potential medium for online faculty development and conducted the present case study in Fall 2021.

Lessons Learned

The usability test interviews, expert survey evaluations, and Google Analytics provided several insights into the user experiences of the FCTL website. We found that (1) the home page was critical to information architecture, and the splash page caused confusion; (2) the link texts serve as action items for site visitors, and succinct labeling is paramount to organizational systems hierarchies; and (3) static web pages encouraged self-directed learning. These findings align with previous research (see Moran, 2019a; Nielsen, 2002, 2011; Shea et al., 2002; Sherer et al., 2003; Sherwin, 2015; Whinton, 2013; Wright, Lohe, & Little, 2018). We elaborate on our findings and lessons learned.

Lesson 1: Splash Home Pages May Cause Confusion

Google Analytics indicated that the home page was one of the most visited pages during the data collection period and that the average number of pages viewed per session (2.55) aligned with “unofficial industry standards” (see Arora, 2022; Littledata, 2022; Spinutech, 2015). However, both usability test participants and expert evaluators identified issues with the website’s home page. For instance, participants had difficulty navigating back to the home page, were unclear about the website’s purpose, struggled with locating contact information,

and felt the first slideshow image on display was confusing. According to center staff, the home page was conceptualized as a splash page with a slideshow carousel of pertinent center announcements. *Splash pages* often feature powerful visuals with minimal text that are intended to captivate users to proceed further into the website (Ghamandi, 2021). However, the T4 WCMS confined the center's design space between the institutional header and footer (see Figure 1). As such, the home page did not function as an actual splash page and instead caused confusion among participants.

Lesson 2: Short Link Texts May Improve Information Architecture

Website visitors rely on hyperlink texts to navigate from one page to the next (i.e., action items; see Nielsen, 2002), and these link texts significantly influence the discoverability of content (Moran, 2019a). Participants in this study found some of the longer link texts confusing (e.g., planning learning, facilitating learning) due to these items being too general and overlapping (Whitenton, 2013). Additionally, as gerunds, these link texts were markedly different from other sub-headings, and this inconsistency may have caused confusion (Krause, 2021). Google Analytics indicated that home, about, programs, and resources were among the most visited pages during the data collection period and that the average time on these pages was shorter than the most popular subpages. Our inference is that the comparatively shorter times aligned with the content displayed on these pages (i.e., the subpages had much more content) and that the short link texts were perspicuous.

Lesson 3: Set-and-Forget Web Pages May Support Informal, Self-Directed Learning

CTL websites are often starting points for formal professional development programs, serving as communication hubs of campus initiatives and providing resources that promote self-directed learning (e.g., web

pages, videos) (Shea et al., 2002; Sherer et al., 2003; Wright, Lohe, & Little, 2018). Expert evaluators in this study identified issues in the interactivity, instructional assessment, and learning design heuristics suggesting that this CTL website could not serve as a formal tool for professional development. Instead, this website and the resources provided on various pages (e.g., text, audio, video) may only encourage self-directed learning or connect users from one institutional happening to another. Expert evaluators also identified issues with the interactive creativity heuristic suggesting that site visitors do not have opportunities to communicate or socially interact with others on the site. The FCTL website pages were predominately variations of static multimedia presentations, some didactic though mostly informative. As such, users had to self-direct their learning.

Improvements

The staff focused their efforts on improving the website's home page by addressing some of the usability and user experiences concerns identified. First, the default page layout within the T4 WCMS was used for the home page, moving the main navigation from large blue buttons in the center to a table of contents on the left with default fonts to maintain consistency and standards (see Krause, 2021; Loranger, 2017; Nielsen, 2024; Nielsen & Molich, 1990). Second, a photo of the center's office location with a new tagline, "A partner in pedagogy across all seven schools," and the center's mission and background story were added. As a newly formed center, the hope was that these changes would better explain the FCTL purpose to first-time site visitors (see Nielsen, 2002). Third, a contact information box was added at the left of the screen and included a consultation request link. Finally, the FCTL podcast, *Moving the Needle*, was affixed below the main navigation table of contents and above the contact information box with a text description. In this way, the FCTL was able to feature the most recent podcast episode that links to a permanent episode archive

and remains constant throughout users' navigation (see Nielsen, 2002). Figure 2 details screenshots of the FCTL website before data collection (left) and after data analysis (right). Interestingly, a comparison of Google Analytics activity before and after the improvements showed that, on average, site visitors stayed on the home page around 10 seconds longer, suggesting that engagement with the home page may have increased.

The FCTL also expanded the responsiveness of the website content presented across devices (e.g., desktop, mobile, tablet). Google Analytics revealed that users predominately used desktop computers to access the website, mobile devices were used less frequently, and tablets were rarely used during the data collection period. However, the analytics also revealed that there was a slow trend emerging in the growth of mobile and tablet access. While the T4 WCMS is a responsive and dynamic system, attention to staff-developed content and the responsiveness and accessibility thereof still needed to be considered. Mobile-friendly design was a primary focus of the FCTL website

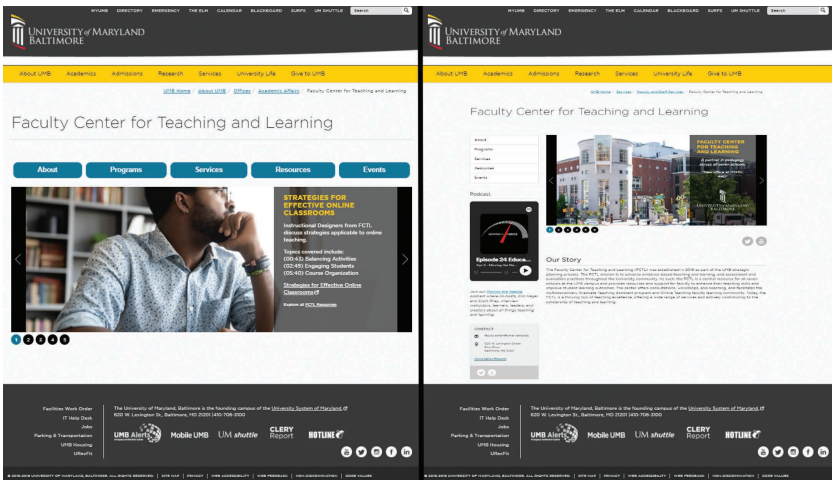


Figure 2. UMB Faculty Center for Teaching and Learning Home Page

Note. Screenshot of FCTL home page captured before data collection in 2021 (left) and after data analysis in 2022 (right).

improvements, and this process consisted of reviewing and updating the WYSIWYG editor content and the layout or order of each content block on each page to provide a consistent look and feel across devices. Additionally, each web page was reviewed for compliance with the Web Content Accessibility Guidelines (WCAG) and updated as appropriate (e.g., adding image alt text, providing audio/video transcription, adjusting color contrast).

Discussion

Given that CTL websites and online faculty development continue to grow (see Belt & Lowenthal, 2020; Herman, 2012; Kelley et al., 2017), greater attention to this distinct medium of professional development is needed to better understand the influence, scope, and reach of this phenomenon on the academy. Previous research has found that adjunct faculty in particular draw significant support from their institutional websites (Chun et al., 2019). The findings of this case study led us to consider online community formation and formal and informal learning via CTL websites in greater depth.

CTL websites are rarely considered web-based communities as there are no formalized membership systems, there are no ways for users to personalize the interface, and there is seldom opportunity for users to insert their identity other than within a comments section (see Gallant et al., 2007). However, the underpinnings of community formation were present on this CTL website, which aligns with previous research (see Sherer et al., 2003). With some minor modification, CTL websites could serve as a place for faculty to share their identities, chat, and grow as a community. For instance, CTL website designers could expand specific pages to include asynchronous discussion forums or synchronous chat features, specific pages could be transitioned to wikis, or specific pages could require login credentials. Such changes would require greater attention to and facilitation of faculty interactions on CTL websites by CTL staff. Nevertheless, faculty visiting CTL

websites may be drawn to certain pages based on common interests that are ripe for community formation, and they may find this medium of professional development more efficient and effective than others.

Faculty perusing CTL websites is an informal professional development activity. As this case has shown, site visitors had to self-direct their learning. However, CTLs are the institutions' pedagogical powerhouses, and their websites should at least proffer an opportunity for formal professional development as visitors navigate them. In order for a website to become more than static multimedia pages, users need to be able to identify themselves on the site, interact with other users, and receive some form of feedback (i.e., collaborative or evaluative). For example, CTL websites could include a live "chat with an ID" tool to provide just-in-time support, didactic pages could be modified to blogs that invite comments from end users, or attributes of the information architecture could be made adaptive and individualized for every user. CTLs would likely need to establish goals, benchmarks, and creative evaluation metrics to assess the impact of such changes on their website relative to faculty development.

Enabling greater interactivity with CTL websites can expand online faculty development efforts in measurable ways (see Stark & Smith, 2016; Sweet et al., 2017; Yuan et al., 2019). For example, adding social opportunities to what would otherwise be considered a non-social website could increase interactivity (Kim et al., 2010). By enabling user inputs and social features (e.g., online assessments, live chat, blogs, wikis, page ratings, reviews, or crowdsourcing), CTLs can analyze competencies, shortfalls, or topics of interest and expand the ways in which they support the faculty of their home institutions. CTLs can also track the number of consultations initiated through the website, the number and nature of live chat support instances, and online assessment results. Furthermore, CTLs can glean insights from Google Analytics or similar software tools about user interactivity to drive professional development. For instance, highly rated content might indicate interest or signal a professional development need, or most visited pages might signal a need for a more formal learning community.

Given the evolving landscape of higher education that is expanding with more flexible and remote working arrangements (see Smyth et al., 2021), websites have increasingly become more vital to the communication and information exchange taking place between faculty and their home institutions (Almahamid et al., 2016; Chun et al., 2019). As such, we present a framework for CTL websites as online faculty development (see Figure 2).

Framework

It is our contention that certain CTL website features (e.g., blogs, wikis, ratings, live chat) may enable faculty to engage with online faculty development in systematic ways that involve two-way interaction, although there is no guarantee that they will engage (Lowenthal, 2008; Lowenthal et al., 2013). Figure 3 portrays how CTL website pages, content, and features can produce measurable responses (e.g., quiz results, chat transcripts, user ratings, page reviews) that can distinguish CTL websites as a medium for online faculty development. For instance, faculty might be afforded the opportunity to create a profile with login credentials, chat in real-time with a CTL staff member, or rate pages. They might also create pages of their own, form or join community subpages, contribute comments to an ongoing discussion, or provide content reviews. As faculty interact with CTL content, the website could track and adapt to their input. After answering true/false or multiple-choice questions, for example, faculty could be directed to different pages or be awarded certificates based on their responses. In this schema, scaffolding, support, and faculty contribution are intentional and may help guide faculty in their learning and development.

In Table 1, our framework posits that the following five aspects and key components are essential to CTL websites as a medium for online faculty development. By emphasizing accessibility, content, engagement, evaluation, and sustainability (ACEES) in the design and development process, CTL websites can function as a distinct form of

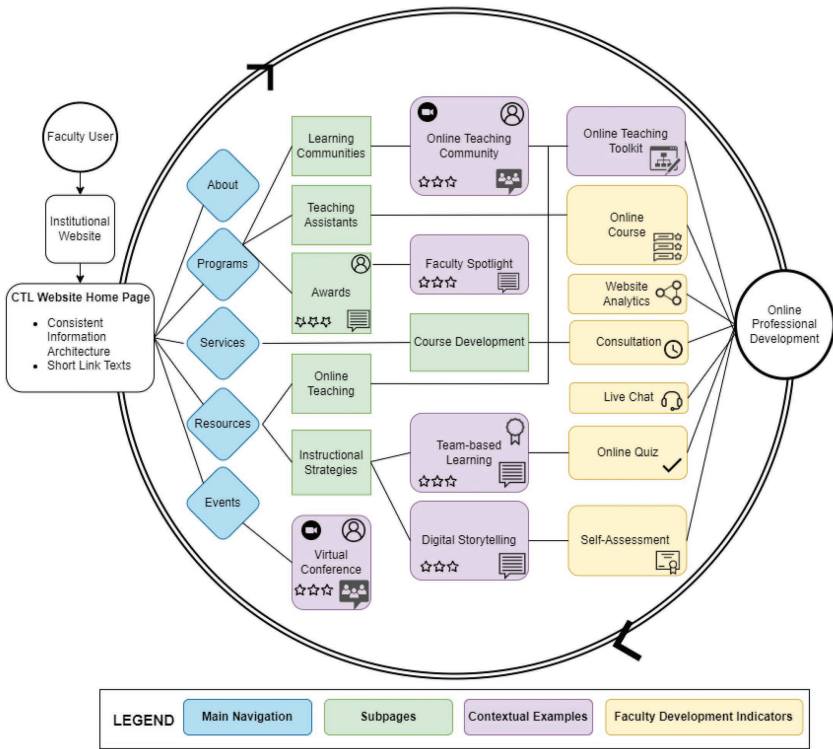


Figure 3. CTL Websites as Online Faculty Development

Note. The contextual examples provided are subpages where faculty visitors might give or receive feedback, earn a credential, or socially interact with other site visitors, the website content, or the website designers. The icons represent various ways interaction and evaluation might occur and include a chat box, a sequence of content, a star rating, a certificate, groups of people, an evaluation mark, an editable web page, live chat, a user profile, data analytics, a badge, and multimedia. The looping circle represents online faculty development that can be systematically designed and evaluated.

Table 1. Framework Components for Enhancing Online Faculty Development via CTL Websites

Aspect	Key components
Accessibility	a. User-friendly interface and navigation b. Integration with other university systems and initiatives c. Responsive web design
Content	a. Relevance to faculty needs b. Timeliness of information

(Continued)

Table 1. (Continued)

Aspect	Key components
Engagement	<ul style="list-style-type: none"> c. Use of evidence-based resources d. Diversity and inclusivity a. Opportunities for faculty interaction, collaboration, and community b. Flexibility and personalization of learning experiences c. Recognition and rewards for faculty
Evaluation	<ul style="list-style-type: none"> a. Tracking of faculty engagement and participation b. Integration of faculty feedback, reflection, and self-assessment c. Regular assessment of program objectives d. Collection and analysis of data to inform future development
Sustainability	<ul style="list-style-type: none"> a. Reliability of technology infrastructure b. Sufficient staffing and resources c. Long-term commitment to continuous improvement

online faculty development. Given the changing workforce dynamics in higher education, and a continued reliance on communication technologies for teaching and learning, further research on CTL websites as a burgeoning medium for online faculty development is needed. As such, we invite empirical investigations of the ACEES framework in different contexts and studies.

Future Research

Future studies should explore the impact, efficacy, and influence of CTL websites as online faculty development. Currently, web analytics are commonly used to measure the impact of a website (e.g., page visits, frequency, length of stay, source acquisitions). However, many quantitative and qualitative questions of how and why site visitors interact with CTL websites are still looming. With the wealth of information openly available across all CTL websites, do faculty prefer using their own institutions' CTL websites? Does the presentation of information on a CTL website influence credibility? How do faculty use CTL websites to improve their teaching practices? Do faculty prefer CTL websites over other forms of professional development? What impact do CTL websites have on faculty teaching, student learning outcomes, and/or professional development? Different theories might provide

insights into phenomena such as self-directed learning (Tough, 1966), adult learning theory (Knowles, 1970), connectivism (Siemens, 2005), planned behavior (Ajzen, 1991), or the cognitive theory of multimedia learning (Mayer, 1997).

Limitations

The findings of this study cannot be generalized to all CTL websites. Readers will have to manage this limitation to assess the credibility, triangulation, and transferability of the findings in their own individual contexts as suggested by Lincoln and Guba (1985). Faculty who volunteered to participate in the usability tests and evaluation survey may have been more familiar with the CTL website than was initially communicated, they may have censored their comments and feedback, and the expertise of evaluators was self-identified. Furthermore, the purposive sampling procedures discussed in the first two data collection phases were adopted within the case and bound by time, space, and activity. Larger sample sizes in these phases may have yielded different results, although the small sample size is common to qualitative research and usability testing (see Nielsen, 2012; Schoch, 2020), and the data collected were intended to shed light on the phenomenon of CTL websites as a medium for online faculty development.

Conclusion

In higher education it is common for one activity to have multiple interpretations (e.g., online learning, online teaching) or similar constructs to have multiple terms (e.g., heutagogy, self-determined learning) that make labeling and categorization daunting. Moreover, how users come to know educational terminology is often based on previous exposures that influence their navigational experiences, making universal ideals of simple and intuitive use quite complicated

and counterintuitive. However, the hierarchical organization of content categories established by the FCTL (i.e., About, Programs, Services, Resources, and Events) were short link texts and an information architecture that appeared to support user experiences and site navigation.

CTL website designers might consider the five topic-based categories presented in this case as an essential top level in their organizational hierarchy to promote external consistency across the field. Still, subgrouping categories would remain a challenge. The FCTL found that environmental scanning combined with adhering to a continuum of consistency (see Krause, 2021) and generating link texts that were specific, sincere, substantial, and succinct (see Moran, 2019a) helped guide the information architecture and supported user experiences.

Designers might also consider collaborating with their marketing and communication departments if interested in developing a distinct splash page and to determine whether branching away from an institutional brand (i.e., headers, footers, consistency) is warranted given the potential usability risks and the scope of the CTL (see Krause, 2021). It may be tempting to want to “make a splash” as was the intent in this case, but the challenges splash screens present are difficult to overcome from a usability perspective, given the fact that users spend most of their time on other sites (Nielsen, 2000, 2011).

Google Analytics data are perhaps best aligned with the purpose and goals of a CTL website. For instance, tracking the average session duration, average time on page, and/or pages per session might give an indication of engagement. If the goal is to have visitors stay on certain pages longer than others, then these pages could be tracked or benchmarks created. Nevertheless, the longer time spent on subpages is likely ideal. Short visits on the home page might suggest that users are able to navigate the information architecture efficiently, combined with prolonged engagement on subpages (e.g., specific resources, specific programs, specific team members, specific services). In this case, the most popular pages were two specific subpages from the

Resources category that described problem-based learning and creating a rubric in detail; these pages included substantial text, several images, a few videos, and a number of references.

At times, website maintenance at higher education institutions may be of low priority and importance (Susanto et al., 2019). Web pages are subject to abandonment with staff turnover, strategic planning changes, or departmental shifting of roles and responsibilities. The fluidity of such change is rarely reflected in institutional web pages, resulting in dated, inaccessible, or inaccurate information being displayed. While some content may remain static over time (e.g., institutional mission statements), most content changes. Whether by design or happenstance, static web pages on CTL websites are not truly responsive to users' needs, they run the risk of becoming outdated, and there are missed opportunities for CTL staff and site visitors to interact.

CTL website designers should continue to develop evidence-based, openly available educational resources that perpetuate the informal interactivity occurring between faculty and faculty developers across the academy. Information sharing is the essence of CTLs, and their websites should funnel users efficiently to their desired aims. This study also led us to consider the need for CTL websites to infuse diversity, equity, and inclusion into the design of the website to achieve a more culturally focused information architecture (see Fiorito, 2014). In other words, particular care and attention should be taken in the design process of CTL websites to develop culturally sensitive, diverse, and equitable resources as more than just static pages or bulleted lists of references.

User interaction with CTL websites is a form of professional development that affords any time, any place learning. Such forms of online professional development that are not limited by time or physical space are growing at educational institutions (Belt & Lowenthal, 2020), and greater attention to this unique medium of professional development is needed. This study is a small contribution to that end and invites further exploration of the lessons learned and the framework

presented in various contexts. The CTL website is a prominent touch-point between faculty and faculty developers. As such, CTLs should consider emergent ways in which site visitor interactions could be enhanced and user experiences improved.

Biographies

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Conflict of Interest Statement

The authors have no conflict of interest.

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Appendix A. Heuristic

General Web Design Heuristics		
Nielsen (1994)	Match between system and the real world	The website should speak the users' language, with words, phrases, and concepts familiar to the user rather than system-oriented terms. Follow real-world conventions, making information appear in a natural and logical order.
	Consistency and standards	Users should not have to wonder whether different words, situations, or actions mean the same thing. Follow platform conventions.
	Recognition rather than recall	Minimize the user's memory load by making objects, actions, and options visible. The user should not have to remember information from one part of the dialogue to another. Instructions for use of the website should be visible or easily retrievable whenever appropriate.
	Flexibility and efficiency of use	Accelerators—unseen by the novice user—may often speed up the interaction for the expert user such that the website can cater to both inexperienced and experienced users. Allow users to tailor frequent actions.
	Aesthetic and minimalist design	Dialogues should not contain information that is irrelevant or rarely needed. Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility.
	Help and documentation	Even though it is better if the website can be used without documentation, it may be necessary to provide help and documentation. Any such information should be easy to search for, focused on the user's task, list concrete steps to be carried out, and not be too large.
Teaching and Learning Heuristics		
Benson et al. (2002)	Interactivity	The website provides content-related interactions and tasks that support meaningful learning.
	Message design	The website presents information in accord with sound information processing principles.

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Teaching and Learning Heuristics		
	Learning design	The interactions in the website have been designed in accord with sound principles of learning theory.
	Media integration	The inclusion of media in the website serves clear pedagogical and/or motivational purposes.
	Instructional assessment	The website provides assessment opportunities that are aligned with objectives and content.
	Resources	The website provides access to all the resources necessary to support effective learning.
Mehlenbacher et al. (2005)	Learner tasks and activities	The website is easily readable with high-quality writing.
Communication and Information Hub Heuristics		
Mehlenbacher et al. (2005)	Social dynamics	Mutual goals and outcomes of site visitors are captured in the website content.
Gallant et al. (2007)	Interactive creativity	Site visitors have opportunities to communicate and actively interact.
	Selection hierarchy	The website groups information into more meaningful clusters for users.
Current study	Community	The website encourages, disseminates, and creates opportunities for online communities to form.
	Representative	The website models the institutional culture of the faculty it serves.
	Timely	The website portrays current news and events.
	Targeted	Communication prose is aptly applied to target audiences.

Appendix B. Google Analytics

	Page title	Avg. time on page	Avg. session duration	Pages/session
1	/problem-based-Learning-pbl	00:02:47	00:00:28	1.09
2	/creating-a-rubric	00:04:58	00:00:22	1.07
3	/fctl	00:00:55	00:03:02	2.55
4	/professional-development-coaching	00:03:25	00:01:11	1.33
5	/team	00:01:20	00:05:53	3.99
6	/graduate-teaching-assistants	00:04:28	00:02:24	1.55
7	/programs	00:00:23	00:38:22	62.75
8	/about	00:00:52	00:00:16	57.25
9	/resources	00:01:24	null	null
10	/course-design	00:02:28	00:00:36	1.93

Appendix C. CTL Website Home Page Link Texts (as of August 17, 2022)

	Ct	Institution	Center	Home page link texts (main navigation)
University system of Maryland	1	University of Maryland, Eastern Shore	Center for Teaching Excellence	Leave a Comment, High-Impact Practices, Teaching Innovations, 2021 Series for New Faculty, Faculty Awards, Faculty Publications, Faculty Forum on Bb, About Us
	2	University of Maryland, College Park	Teaching & Learning Transformation Center	About Us, Instructors, Students, Academic Administrators, Researchers
	3	University of Maryland, Baltimore County	Faculty Development Center	Home, Services, Teaching, Communities, Innovation, Research, Assessment, Resources, About
	4	University of Baltimore	Center for Excellence in Learning, Teaching and Technology	Sakai, Programs & Services, Faculty Development, Contact Us, Bee-Flex, LMS Review Project
	5	Towson University	Faculty Academic Center of Excellence at Towson	Events, Programs, Services, Research & Scholarship Resources, Teaching Resources, Emerging Technology, About Us
	6	Salisbury University	Instructional Design & Delivery	MyClasses, Instructional Software, Workshops & ID&D Calendar, Faculty Development, Online Learning, Services, Instructional Designer Liaisons, ID&D Knowledgebase, Staff
	7	Bowie State University	Center for Excellence in Teaching & Learning	Faculty Institute, Adjunct Faculty Institute, Faculty Professional Development, Become a HIT Instructor, About CETL
	8	Frostburg State University	Center for Teaching Excellence	CTE Home, CTEAG Membership

	Ct	Institution	Center	Home page link texts (main navigation)
Maryland	9	Coppin State University	Center for Excellence in Teaching and Learning	Our Purpose, Share General Feedback, Events, Request to Present, Faculty Resources, Needs Assessment
	10	United States Naval Academy	Center for Teaching and Learning	CTL, Home, Programs, Educational Technologies, Teaching Awards, Faculty Resources, Teaching Resources, CTL Conferences and Workshops, Workshops on Demand, Photo Gallery, Ed Tech Resources, Contact Information
	11	Morgan State University	Center for Innovative Instruction & Scholarship	About
	12	Goucher College	Center for the Advancement of Scholarship and Teaching	Home, Blog, Workshops, Teaching, Scholarship
	13	Hood College	Center for Teaching & Learning	About
	14	Loyola University Maryland	Office of Digital Teaching & Learning	Home, About Us, Course Design, Programs and Projects, Tools
	15	Maryland Institute College of Art	Center for Teaching Innovation & Exchange	Mission & Vision, Programs, Resources, Services, Graduate Teaching Internship, Submit a Question or Idea, Educational Technology
	16	Mount St. Mary's University	Center for Instructional Design and Delivery	Student Resources, Faculty Resources
17	Washington College	Cromwell Center for Teaching and Learning	Advisory Board, Funding Opportunities, Resources, Cromwell Fellowships for Faculty, Masticate and Confabulate, Teaching Clusters	

(Continued)

(Continued)

	Ct	Institution	Center	Home page link texts (main navigation)
Other U.S. states	18	Johns Hopkins University	Center for Teaching and Learning	Programs & Services, Tools & Tech, Teaching, Publications, Contact
	19	University of Washington	Center for Teaching and Learning	Home, Topics, Learn With Us, News & Events, About, Contact
	20	University of Pennsylvania	Center for Teaching and Learning	Home, Contact CTL Staff, Programs & Services, Resources for Teaching at Penn, Teaching Practices and Strategies, Events
	21	University of Pittsburgh	University Center for Teaching and Learning	Learning Initiatives, Technology Resources, Teaching Support, News & Events, About
	22	University of Oregon	Center on Teaching and Learning	Research, Innovation, People, About
	23	The University of Texas at Austin	Center for Teaching and Learning	Instructional Strategies, Teaching with Technology, Programs & Initiatives, Grants & Fellowships, About
	24	Vanderbilt University	Center for Teaching	Home, Services, Programs, Orientations, Events, Guides, Resources, About, Connect
	25	University of California, Berkeley	Center for Teaching & Learning	Home, About, Consulting, Programs, Resources, Spotlights on Teaching & Learning
	26	University of Delaware	Center for Teaching & Assessment of Learning	About Us, Programs, Services, Resources, CTAL Library, Confidentiality
	27	Virginia Tech	Center for Excellence in Teaching and Learning	Home, Programs, Services, Teaching as Research, Grants and Awards, Academy for Experiential Learning, Thank-A-Teacher Program, Teaching in the News, Staff Directory, Teaching Resources, Course Design, Resources, Newsletter, Archive, Bridge Experience Program

	Ct	Institution	Center	Home page link texts (main navigation)
Predominantly postgraduate institutions	28	University of Virginia	Center for Teaching Excellence	Workshops & Events, Programs & Grants, Research & Resources, ConneCTEd, About
	29	Virginia Commonwealth University	Center for Teaching and Learning Excellence & Faculty Success	Events, Initiatives, Resources, About
	30	West Virginia University	Teaching and Learning Commons	Home, About Us, Programs and Services, Events & Workshops, Quality Matters, Resources, Academic Technology
	31	Shepherd University	Center for Teaching and Learning	Home, Meet the Team, Faculty Support and Teaching Tools, Focus on Student Learning Series, Faculty Affairs
	32	Rutgers University	Center for Teaching Advancement & Assessment Research	Teaching, Assessment, Instructional Ratings, Workshops, Technology
	33	Columbia University	Center for Teaching and Learning	For Faculty, For Graduate Students, Resources and Technology, About the CTL
	34	A.T. Still University	Teaching & Learning Center	About Us, Events, Services, Programs, Resources, Research
	35	Adler University	Center for Learning and Teaching	CLT Services, Writing Support: Start Here, Brainfuse, Grammarly, Tutors & Workshops, Statistics Research Design, APA 7, Dissertations, Cover Letters Resumes and CVs
	36	Air Force Institute of Technology	Teaching & Learning Center	TLC Home, Programs, Services, Writing Lab, Support Team, MSOTL Forum, Connect With Us

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Ct	Institution	Center	Home page link texts (main navigation)
37	Claremont Colleges	Center for Learning and Teaching	Home, Our Mission, Services, Resources, Contact Us, Online Teaching & Learning Support
38	Naval Postgraduate School	Teaching and Learning Commons	Home, Resources, Initiatives, About TLC, Contact Us
39	Oregon Health & Science University	Teaching and Learning Center	Academic Technology, Faculty Development, Academic Support, Training Future Faculty
40	University of California, San Francisco	Teaching & Learning Center	Classroom, Event Support, A/V, Video Services, Engineering & Design

Note. Data collection occurred on August 17, 2022; as such, some of the naming conventions of the centers listed, their associated hyperlinks, and their home page link texts may have since changed.