Setting up, Troubleshooting, and Innovating on the Delivery of Online Instruction: A Case Study of an LMS Q&A forum

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ABSTRACT

With the recent surge in online teaching, increasing numbers of instructors are using learning management systems (LMSs) to migrate their courses online and adapt their teaching methods. Given the steep learning curve for these feature-rich software applications, many instructors turn to online Q&A forums for help with learning and troubleshooting their LMS. We analyzed the content of 250 posts from a community-based Q&A forum for Canvas, a widely-used LMS, finding several recurring themes that illustrate how instructors are setting up courses for the first time, facilitating shared experiences between their students, and even seeking innovative ways to customize their course delivery. Our findings shed light on key barriers driving instructors to seek help and to what extent their help needs are actually addressed by the community. We discuss several opportunities for improving the design of LMSs and for better understanding and supporting instructors' custom needs to enhance their course delivery.

Author Keywords

Learning management systems; digital classroom tools; help-seeking practices; instructor communities; software help forums; software troubleshooting

CCS Concepts

•**Human-centered computing → Empirical studies in HCI;**

INTRODUCTION

Recent years have seen widespread adoption of various software tools in both K-12 and post-secondary educational environments [23]. Among the most popular of these software tools are *learning management systems* (LMSs), which encompass a wide array of features ranging from assignment submission and grade-keeping to more advanced use cases involving student collaboration, online lecture delivery, and conducting assessments. The feature-rich user interfaces of

LMSs can present a substantial learning curve to those unfamiliar with using them [41, 43].

Past research has demonstrated that course instructors rarely have enough spare time to learn the features of their LMS in depth [3], given their busy schedules and primary focus on other teaching duties. While navigating the complexity of LMSs and other digital classroom tools, instructors regularly turn to their colleagues for in-person collaborative help [40]. However, the ongoing COVID-19 pandemic has left few in-person help options for many instructors around the world who have had to quickly adapt to fully online or hybrid teaching methods [21, 28] on their own. Most of these instructors have been migrating their in-person courses to an LMS which may be entirely unfamiliar to them or require them to learn many new features on short notice.

Although there is growing evidence that instructors often participate in online communities for professional development and to learn from their peers in other schools and organizations [4, 10], we know little about how they use such communities for learning and troubleshooting digital classroom tools, such as LMSs. For example, most popular LMSs today augment their documentation and tutorials with online forums or Q&A websites that provide access to a valuable community focused on helping users learn and share their LMS-specific experiences. However, we lack insights into how these forums get used, what types of issues get discussed, and to what extent instructors are able to find relevant answers. By better understanding how instructors currently make use of online Q&A communities in setting up and troubleshooting LMSs, we can gain insight into key usability issues affecting LMSs and move toward developing more targeted technical support and community-based support approaches.

To investigate how instructors make use of online communities to learn and seek help for complex LMS features, we conducted a qualitative forum content analysis of posts from the official Q&A website [20] for *Canvas*, currently the most widely-used LMS in US-based higher education [8], with over 30 million users [25]. Our analysis uncovers many insights into the challenges LMS newcomers face in getting help with first-time setup, and instructors' drive to collaboratively build meaningful shared experiences with (and between) students. We highlight several ways in which instructors desire to innovate on their teaching methods and seek advice on adapting their existing routines to an online environment. But, in doing

so, we also point out that forums may not always be ideal for supporting instructors' idiosyncratic needs related to customizing their course setups, as many such questions often received no replies or could not be easily resolved by the community.

This paper contributes empirical insights into the key themes and types of questions asked by instructors and examines how these questions are addressed on a popular LMS discussion forum. In particular, we highlight the growing need for targeted help to address instructors' more nuanced questions surrounding innovative teaching practices and LMS customizations. We present design implications for improving community integration within LMSs and other classroom software, as well as opportunities for better adapting these tools to the unique and pressing needs of instructors, especially given the rise of remote learning and teaching practices.

RELATED WORK
Our work builds upon existing research in HCI and learning sciences on instructors' classroom teaching practices, their use of educational technology, and their use of community-driven help forums.

Instructors' use of LMSs and other digital classroom tools
For many years, several research works have shed light on instructors' practices and motivations in learning to use and integrate digital tools in their teaching, as well as the barriers hindering effective use of such tools. Past work has examined how K-12 teachers experience the setup and usage of digital classroom tools including LMSs [40], the benefits and drawbacks of LMS use among post-secondary instructors [22], and the factors influencing LMS adoption among university faculty [11]. A variety of novel technologies aim to help teachers manage their classroom effectively [1, 2, 14] and to support the creation of impactful learning experiences within an LMS [7]. The student experience with LMSs has also been widely studied [5, 24, 35, 36], sometimes finding a large gulf between how students and instructors perceive the system [9].

In this paper, we focus on instructors' learning and troubleshooting experiences as they tend to rely heavily on *communities of practice* [27, 42] for social learning and support with their teaching. In particular, instructors regularly form peer groups to discuss and seek support for their classroom software, including LMSs [40]. We contextualize our findings through the lens of online communities of practice and hope to gain a broader understanding of how instructors rely on this online community support for learning and guidance with their LMSs.

Finally, some recent work has sought to explore the role of software customization in instructors' day-to-day use of educational technology [40], and to design LMS extensions that encourage this customization in a social context [41]. Our paper lends further weight to the importance of this lens, finding that a substantial portion of help requests on an LMS forum were related to customizing the user interface in some way.

Help-seeking strategies in online forums
Analysis of posts in online help or Q&A forums has long been a useful strategy for uncovering insights into the motivations,

struggles, and help-seeking strategies of a group of individuals sharing common activities or interests [32, 33]. For instance, past work has characterized the different ways that students ask math questions on a calculus forum [39], explored what types of career advice responses are most valued in an online career support community [38], and examined the differences in argumentation style between experts and newcomers on a programming language help forum [37]. Hudson et al. [15] examined several community-based software help forums to uncover what aspects of an initial help-seeking forum post tend to prompt requests for further clarification from help-givers. Some researchers also suggest methodologies for conducting qualitative research using managed online forums as an asynchronous alternative to in-person focus groups, and highlight some practical issues in doing so [16, 17].

Prestridge [26] analyzed teachers' posts across a school year in an online forum focused on information technology, finding that their participation fostered a sense of community and contributed to their professional development by encouraging constructive dialogue that "enable[s] teachers to transform their pedagogical beliefs and practices." In this paper, we further investigate the role these online communities play in instructors' collaborative jobs, particularly when their teaching and related interactions are taking place primarily in an online setting. This has distinct implications not only for how instructors seek help from one another in learning their LMS, but also for the effective design of LMSs and other classroom software in general.

FORUM CONTENT ANALYSIS
To understand the role that web-based help communities play in how instructors learn to use their LMSs, we conducted a content analysis on the questions posted to *Canvas Community* [20], the dedicated online help forum for the Canvas LMS [19] (described further below). Canvas is currently the most widely-used LMS for higher education in the United States, and it has growing international usage as well [8]. As such, we believe that analyzing this LMS and its help forum can provide a case study representative of the broader issues affecting instructors across similar platforms. Our data collection for this study was influenced in part by the ongoing pandemic that has forced many instructors to transition to teaching online this past year.

The following research question guided our inquiry: *How do instructors make use of online community-driven help forums to collaboratively learn and troubleshoot an LMS to build and improve their online courses?*

About Canvas and the Canvas Community forum
Like many popular LMSs, Canvas provides a means for teachers to build web pages for their course that make use of a variety of educational features. Some built-in features of Canvas enable the delivery and marking of quizzes and assignments, grade-keeping, posting announcements, and running forum-style discussion boards for student and instructor participation. Instructors can arrange their course content into modules and custom pages, and gate progress according to student learning milestones. More advanced features allow instructors and school administrators to embed third-party content and tools,

Figure 1. The Canvas Community "New Message" page, where instructors compose their questions.

such as those implementing the Learning Tools Interoperability (LTI) specification [18]. Canvas Community is an official online support resource for the Canvas LMS, comprising a community-driven Q&A forum, a variety of usage guides and documentation, and additional hubs for product suggestions, role-based discussion, and other topics. This paper samples and analyzes posts from the Q&A forum section, though many of these posts also make reference to guides and discussions elsewhere on the Canvas Community website. We primarily focused on the question body text of each post, which instructors submit to the forum via the authoring page shown in Figure 1.

Pilot sample to derive codes

We took a multi-step qualitative approach to perform the content analysis. We began by examining the content of the 50 most recent questions on the Canvas Community forum (during June 2020). We sought to understand the kinds of questions forum users were asking about using the Canvas LMS and what type of pain points they described. We saw a wide range of questions in this data, from struggles in setting up a new course, to troubleshooting the appearance of a setup from the perspective of students, and even asking for suggestions for integrating third party applications. We also observed some patterns in the types of questions being asked by the users (e.g., how-to questions about a feature or whether a feature exists) and tried to classify them by broad categories of help requests proposed in prior work (e.g., [31]). After our initial examination of the data, we took an open coding [34] approach to develop a coding scheme to segment the posts based on the types of questions that were being asked, and the types of issues that were being referenced.

Development of codes and reliability

Next, we extracted a different sample of 80 recent posts that had over 50 views from the forums and iteratively applied our

coding scheme. The sample was independently coded by two researchers over three iterations, discussing disagreements after each pass and independently revising the codes. All of the co-authors extensively discussed each code and its relevance and performed multiple iterations to refine the coding scheme. Our final coding scheme had codes such as (not exhaustive): **(1)** *"how to question about feature,"* **(2)** *"seeking best practices,"* **(3)** *"where is this feature,"* **(4)** *"troubleshooting UI,"* **(5)** *"student-facing UI issues."* **(6)** *"administrator issues."* We noted that many of the codes that we derived showed that within the forum community, much of the discussion and types of questions asked were related to the user interface of Canvas. To check the reliability of our final coding scheme, we computed the inter-rater reliability on the final pass of the coding scheme applied to this sample by two independent researchers, resulting in a Cohen's kappa score of 0.89.

Finally, we applied this coding scheme to a larger sample of 250 posts from the Canvas community forum.

Analysis of the larger sample

To derive our larger sample, we began by collecting basic metadata (URL and creation timestamp) for every question posted to Canvas Community's "Question Forum" section between March 15, 2020 and July 15, 2020 – there were 7647 such questions in total. We selected this time frame as it corresponded roughly with the time during which many schools and universities in North America (and elsewhere worldwide) were in the process of moving classes online. This metadata was scraped from the web-accessible list of questions posts using a script to navigate between pages and extract the information. Our scraper included reasonable delays to avoid causing large usage spikes on the Canvas Community servers.

We then extracted a uniform random sample of 250 question posts from this set, and ran another script to scrape the question body, tags, replies, views, likes, and other data from the Q&A page for each question. One coder performed an initial pass over the sample and found 11 posts that were unsuitable for our analysis (e.g., not in English, or a blank question body). These posts were removed from the sample and replaced with new randomly-selected posts from the remaining data set, maintaining a sample size of 250.

In this sample of posts, the average number of views per question was 66.9, ranging from a minimum of 7 to a maximum of 1701. Although 109 of the 250 posts included tags (which were optional for authors to add), we found these tags were too varied, idiosyncratic, and inconsistent to derive a meaningful analysis separate from the question body text. This inconsistency may have been attributed to limits of the Canvas Community forum at the time of analysis as it did not support "smart" tagging, or AI based recommended tags. On average, each question in our sample received 1.38 replies. Additionally, only 12 posts had received any likes.

We focused our analysis on examining the question body text of each forum post and applied our coding scheme accordingly. We split our sample in two with each half coded by a separate independent coder. Based on our reliability score on the pilot sample, we were confident that our coding scheme was repre-

Table 1. Types of questions

Type of question	Freq.	Example
"How-to" questions about a feature	32.4%	*"How do I enter grade in gradebook?"*
UI troubleshooting questions	27.6%	*"I was using conference [...] and tried to upload a power point but I was unable to. [...] I was able to upload a video. What am I doing wrong."*
Questions about best practices	23.2%	*"I need to go in and adjust grades for quite a few students. What is the easiest way to do this?"*
"Where is this feature" questions (incl. requests for new features)	16.8%	*"Is there a Character Limit option for New Quizzes? I would very much like to see this feature added."*

sentative of the types of questions asked in the forum. After this first coding pass, we segmented the data by high-level question types (listed in Table 1). The most frequent questions were how-to questions about features of Canvas (32.4%), followed by posts about troubleshooting UI issues (27.6%) and questions about best practices (23.2%), such as seeking recommended strategies for course setup or feature-specific tasks. The remaining questions were mostly about where to find a feature, whether a feature existed, or whether a new feature could be added to Canvas.

We next explored the content of the question posts within each segment and observed that there were some cross-cutting themes that emerged across each question-type segment of the sample (listed in Table 2).

At the time of the analysis, the forum posts did not provide explicit information about each user's role within their school (e.g., instructor, student, administrator). Based on the post details and context, we could infer that the majority of the posts were written by instructors in schools, colleges, or universities. In fact, out of 250 posts, we found that only a minority of posts (5.6%) appeared to be from non-instructors, including 8 posts by students, 2 posts by parents, and 4 posts where the author seemed to be an administrator or IT support staff.

RESULTS

Our analysis uncovered several cross-cutting topics throughout the different question types. Table 2 shows the representative themes: 1) navigating the first-time setup experience, 2) facilitating shared LMS experiences between different users, and 3) innovating on course delivery. Another small number of posts (4.8% of our sample) did not fall into these because they were either fragmented or lacked context. We expand on the three key recurring themes below and provide excerpts from our data set (labeled with #) for support.

Theme 1: Navigating the first-time setup experience

We found that about a fifth of the questions in our sample (47/250, 18.8%) were related to setting up a course for the first time or configuring various individual Canvas LMS features. This was not surprising given that our sample reflected a timeframe where many teachers around the world had moved to online teaching for the first time.

Many of these posts (32/47) concerned the initial setup process for a Canvas course, such as defining the course structure and initializing basic features. Around half of these were written

by users who indicated that they were *"new to Canvas"* or were using Canvas *"for the first time."* These questions ranged from learning how to accomplish relatively simple tasks (e.g., *"How do you set up course navigation menu?" (#167)*) to more involved setup procedures (e.g., *"I would like to add a new blank sandbox or delete all the information in an existing one. How do I do this?" (#10)*).

Of the posts on navigating setup, over a quarter (13/47) were questions about seeking best practices. For instance, in one post an instructor wanted to find a better way to support student collaboration: *"I am trying to cross list my sections in Canvas so that the students can participate in a group discussion. I don't see the cross list tab on the right side of the screen [...] Is there another way to connect my classes?" (#12)*. In many cases, the authors of these questions would simply indicate an end goal or list the difficulties in their current setup, in the hope that other users might know a better way of achieving it: *"I've organized my modules into categories, but there could be 12 topics within a module. I would like to distinguish them easily from each other." (#186)*.

Theme 2: Facilitating shared LMS experiences

Nearly a third of our sample (82/250, 32.8%) were posts related to student-motivated aspects of course delivery, such as facilitating student collaboration or managing access to different pages of the course. Given that our sample reflected a time when many instructors were shifting their courses online, it was understandable that creating an environment of shared learning and collaboration without face-to-face meetings would be particularly challenging.

Many of these posts (35/82) were from instructors struggling with the disparity between their own interface and what their students could see. Some posts (12/82) mentioned using the "Student View" feature in Canvas (which allows instructors to test their course from a student's perspective) or troubleshooting discrepancies between the different perspectives. Most frequently, instructors had enabled a feature or added content for students to interact with but were surprised to learn that their students couldn't see it: *"I have enabled and saved the announcements tab to be seen by students [...] However, it still has an eyeball [icon indicating visibility] by announcements but students can not see it." (#81)*

Another frequent topic in this theme involved instructors seeking guidance on how different features would affect students in ways the instructor could not easily test: *"How does the*

extra time assigned a student for quizzes and exams work? Does the student's time run out and then the extra time starts? How do they view this in their quiz or exam?" (#83). Some instructors also expressed interest in features or help resources aimed at better supporting their students, such as #31: *"Is there a guide for how students can upload videos to Canvas as a file submission for an assignment?"*

A substantial portion (33/82) of posts were about instructors wanting to support student collaboration or communication with each other. Many cases involved uncertainties in setting up group work environments or group discussions for students. In #13, the instructor was unsure how to enable a peer assessment process for written work: *"I've put them into groups of 3, but I think that if I use 'Collaborate' they will only be able to see one of their documents. How can I best set it up so they can respond to documents from the other group members?"* Further challenges arose in clarifying what information was visible to students, often to avoid confusion: *"kiddos are really confused about information in the gradebook from [...] before we went online virtual. I want to clean up the gradebook so they can only see the assignments they [need to be] worried about" (#52).* Commonly, instructors were seeking better ways to keep students up-to-date on course information, set up reminders, and help students actively engage with the course in the absence of face-to-face meetings.

Another third of the posts (24/82) in this theme highlighted the struggle of managing appropriate access to course content among students, parents, and other instructors as they try to navigate the online course delivery experience. For instructors, access issues often related to making sure their students and collaborators were able to successfully enroll in the course and access content on time, e.g.: *"My colleague wanted to enrol to a course provided by Canvas [...] She didn't received any confirmation [of] her enrolment. What should we do?" (#112).* Other cases involved making sure particular user groups were granted access to certain course content: *"I just [had] a conference in Canvas with few attendees. How can the students not on the conference access the recordings?" (#118).*

Theme 3: Innovating on course delivery
Another major theme that emerged in our analysis was about instructors seeking methods to innovate on teaching practices and customize their LMS for online delivery. A sizable segment of our sample (109/250 43.6%) fell into this category.

In view of the time frame for our data collection, it was not surprising to see that many of these questions were about new features and methods for facilitating remote learning. Frequently, instructors were looking for suitable replacements in the LMS for elements of their in-person teaching practices, such as migrating an existing routine or activity to the online setting. Several posts described situations where a lesson designed for face-to-face instruction seemed impossible or too complex to replicate within the LMS: *"I usually have a on-site hands-on anatomy lab practical [...] With the COVID-19 crisis, I need to do it online and thought of choosing to only show students one station/question at a time with pictures [...] can I limit the time for each question/station to 1.5 minutes*

and allow students to return to stations [...] that they flagged for 10 more minutes?" (#76).

Nearly half (49/109) of the posts in this theme concerned setting up or troubleshooting video-related features, such as video assignment submissions, online lecture recordings, and tips on embedding videos in Canvas course pages.

For instance, some instructors faced challenges in exploring unfamiliar video tools, compounded by the difficulty of managing the student perspective of the LMS: *"During an online conference with the students [...] I share my screen. However, the students see only half of the slide. Can you please help on this?" (#14).* As video features may have been unfamiliar to a wide range of instructors, many questions in this theme concerned best practices for using videos, such as finding workflows for asynchronous lecture delivery, e.g.: *"One option [...] is using the 'Record/Upload media' button within the Rich Content Editor. [...] is it a good approach, does it stream them properly, or should I instead look to videos uploaded via Studio?" (#25).*

A further third (39/109) of the posts in this theme asked about managing online assessments, such as LMS-based quizzes, exams, and assignments. Among these, key questions concerned integrating external tools to prevent students from cheating in online exams (e.g., LockDown Browser [29]), and to ensure that assessments were administered equitably for different student needs, e.g.: *"Is there a tool like Immersive Reader that will read quizzes to students in Canvas?" (#57).* Some instructors who made attempts to adapt their existing assessment methods to the online setting occasionally faced difficulty in fully implementing their ideas. For instance, one computing teacher explained that they want to deliver a *"MS WORD [...] assessment task [...] business letter [...]. Usually, students do it in class on laptops where teachers are monitoring them but now with the new online and remote learning, is there a way to do it?" (#33).*

We also found that instructors (and potentially some school administrators) were frequently seeking out way to make customizations to Canvas to smooth the transition from in-person to online teaching. These customizations took the form of various changes to the default user interface, such as altering what Canvas features were available to students in their course, the order they appear in the navigation, or the visual theme of their course: *"I was wondering if there was a way to colour the different aspects in a module as above. [image shown] So that at a glance students could have a visual cue to where they are expected to upload or complete assignments" (#177).* Many posts centered on integrating third-party tools into the LMS to add new features or to streamline instructors' workflows: *"Can Canvas/Kaltura add an option to combine individual Kaltura student videos into one final student group video? [...] This saves a lot of (unnecessary) work" (#188).*

Analysis of unanswered & unresolved questions
Although the Q&A forum for Canvas offers a space for questions to be discussed and answered, we observed that around 1/5 of the posts were still left unanswered (i.e., with 0 replies). Also, although on average each question in our sample re-

Table 2. Cross-cutting Themes

Cross-cutting Themes	Freq.	Summary of findings
Navigating the first-time setup experience	18.8%	– Seeking best practices for basic LMS features – Novice users learning simple tasks
Facilitating shared LMS experiences	32.8%	– Largely how-to and troubleshooting questions – Student-facing UI issues – Supporting student collaboration/communication – Managing shared access to courses and content
Innovating on course delivery	43.6%	– Adapting teaching practices to online settings – Troubleshooting video features and online assessments – Customizing the LMS to support new workflows

ceived 1.38 replies, we saw some indication that even questions with numerous replies did not actually resolve the original author's issue. This was particularly evident in posts where an instructor was asking a question about innovating or customizing the LMS to meet a unique need or goal. In fact, almost a third (28.4%) of the questions relating to the theme of innovating on course delivery did not receive even a single reply.

Our analysis revealed that simpler setup-related questions often received answers from forum moderators or support staff linking to a related Canvas community guide. Yet questions about more complex or particular setup practices that alluded to instructor's unique needs were often left unanswered. For instance, one instructor received no replies to a question (#63) asking how to migrate their custom weighted grading scheme from another LMS that catered to the particular needs of their nursing faculty. Most unanswered questions related to facilitating a shared learning environment were about troubleshooting the pertinent challenge of communication with students despite a disparity between instructor and student views of the LMS: *"How do I ensure comments in comments box is not visible to student? The eye with the line through it is on but the students is still receiving the comments before I post the grades." (#145).*

It is worth noting that nuanced questions concerning the unique challenges of transitioning to online course delivery were also often left unanswered by the community, e.g.: *"I need help posting a Powerpoint presentation with audio. [...] When I tried to upload to Canvas it forced me to download the file and I couldn't get the audio to play" (#109).* Instructors faced further challenges in finding help with customizing their courses to adapt to newly asynchronous environments or to suit other unique goals, such as in post #30 which received no responses from the community: *"I am trying to find ways for students to engage with each other a-synchronously. [...] I would like peers reviewing an assignment to be able to see what other peers have posted."*

Moreover, even among those posts that did receive replies, it was not always the case that the original question was resolved. Particularly in cases where instructors sought to innovate, they would sometimes end up having idiosyncratic needs that proved difficult for the community to answer successfully. For instance, in one post about uploading a recording: *"I just did a 16+ minute video using the webcam to...diagram on a whiteboard...then I discovered there was no visual, [...] the visual is nothing but a green screen throughout [...] Why did this happen?" (#20).* This post received 6 replies (which was well above the average of 1.38 replies), yet the responses did not succeed in solving the problem to the satisfaction of the author. Later in the thread, the author commented, *"I was hoping someone from Canvas would tell me the 'video' part of my upload was stored somewhere on Canvas' [...] Oh well...".*

In summary, while the majority of help-seekers appeared to find the help they needed from community responses, a sizeable segment was still left with little to no support, especially when facing challenges with time-sensitive course adaptations and complex innovations with the LMS. We elaborate on some avenues for addressing these issues in the next section.

DISCUSSION

Our findings (summarized in Table 2) shed light on a number of key issues that instructors face in the course of learning, setting up, using, and troubleshooting their LMSs. Since we only studied one instance of an LMS help forum, there should be some caution taken in interpreting the findings. However, we note that Canvas currently has the largest market share among LMSs in the US and is consistently growing its market share in several international regions [8], indicating that it is likely a suitable model for this exploratory research. It is also worth noting that the sampled time period overlaps with the considerable changes in teaching practices brought on by the COVID-19 pandemic. While our results may lose some applicability under more ordinary teaching circumstances, the findings nonetheless shed light on many of the unusual difficulties facing instructors during this time period.

Based on the key insights from our work, we now reflect on the broader themes and suggest recommendations for improving LMS design and the design of online communities for instructors.

The value of community-based learning for instructors

At a high level, our findings illustrate a number of ways in which participating in the Q&A forum proved beneficial for instructors as they received replies for around 80% of their questions. It appeared to be particularly valuable for newcomers to the LMS, as they tried to make sense of the numerous features or understand how the LMS differs from other software they might be used to. Although we have found some evidence that the forum provided assistance with "learning

the ropes," it remains unclear to what extent these community solutions could help support novice-to-expert transitions [6] among software-using instructors. While there is some debate about the practical value of communities of practice for new instructors [12], initial explorations of online communities of practice have shown promise for broader teacher professional development [13, 30].

We also saw several instances of instructors seeking features or changes that would require administrator-level changes to their school's Canvas account — cases where the online community was unable to offer help beyond directing the help-seeker to contact their school's administrator. In such cases, there is need for more localized institution-level solutions (e.g., sub-forums, peer groups,) allowing instructors to seek LMS help from smaller tight-knit communities. Members of these communities can coalesce around a shared interest of improving their online course delivery, bringing together instructors, administrators, and other stakeholders.

Challenges in providing support for LMS customizations

A recurring sub-theme in the how-to questions posted by instructors concerned how to customize the Canvas user interface or its content. Consistent with other studies in educational contexts [40], many of these customizations focused on the student experience rather than the instructor's own needs to customize their environment, an important distinction from more widely-studied customization activities in personal use contexts. Given that LMSs tend to be highly feature-rich with numerous customizable options, it is perhaps not surprising that this aspect of their usage presents a significant barrier to learnability.

Many of the customization-related questions were often narrow in scope (e.g., configuring a certain course-wide setting, integrating third-party tools). But, a large number of questions were also about more complex customizations where instructors tried to convey a detailed picture of their goals or efforts in customizing a whole course. Unsurprisingly, for these more heavily customized courses with many idiosyncratic changes, instructors faced more challenges in getting help, with many such questions receiving no responses at all.

The lack of support for customization-related questions may simply indicate that fewer help-givers were familiar with these advanced topics to confidently respond to them. However, it also points toward opportunities for better filtering users based on role and expertise level to direct more advanced users toward these types of questions where their expertise could be valuable. Past research has found that it is common for teachers to rely on one or more go-to "tech expert" teachers at their school for troubleshooting and help with customization [40], a model that could be valuable to emulate in a Q&A forum setting. Furthermore, additional research could investigate how instructors working remotely are innovating course delivery and customization to better understand what factors influence receiving more timely or better quality answers. Some recent tools, such as Customizer [41], have been designed to facilitate the process of customizing an LMS through in-application example-based sharing mechanisms, but there remain further

opportunities to facilitate course customizations for different instructor needs.

Implications for designing LMSs and support resources

Our analysis uncovered a variety of persistent issues that warrant the attention of researchers and practitioners in the HCI and learning sciences community. We now discuss several recommendations and opportunities for improving the workflows and experiences of instructors as they learn, use, and seek help for their LMS.

Promote expertise-based participation in online communities.
Many of the instructors' questions posted to the Canvas Community Q&A forum alluded to differing needs and problems which could not necessarily be resolved by other instructors. For example, some posts sought solutions to site-specific problems that needed to be addressed by IT staff or administrators at the author's own school. In a few cases, IT staff were even asking their own questions about resolving technical nuances in setting up a school-wide Canvas instance. This presents a challenge for newcomers with different roles (instructors, administrators, students, etc.) who are struggling to find content and answers to questions relevant to their own needs, particularly with complex software such as LMSs. We believe this issue can be tackled through thoughtful personalization of the help-seeking experience that better caters to each user's role, such as by filtering or promoting the help content most relevant to that role. Promisingly, after a more recent update in late 2020, the Canvas Community now initially directs new users to more specific "group hub" forums depending on their role.

Provide more in-place guidance for remote teaching features.
There is a pressing need for clearer built-in instructions or tutorials detailing how to transition to using "fully-online teaching" features like those for conducting live lectures, recording videos, or protecting academic integrity of online exams. LMS designers should strive to use terminology that instructors are most familiar with or provide easy ways to provide translations from in-person to remote instruction within the application. Additional support for setting up these features can serve to mitigate the high number of help requests and problems instructors have been facing, particularly given the recent surge in usage of LMSs in remote learning.

Aim for consistency between instructor and student interfaces.
Given how commonly teachers faced confusion over subtle differences in visibility or functionality between their own Canvas view and that of their students, LMS designers should prioritize consistency between the two wherever possible. The Student View feature in Canvas is a useful starting point, but as the instructors' Q&A indicated, viewing the changes consistently in heavily customized courses could still be challenging. More broadly, this issue of consistency lends further weight to recent, more general calls to action on interface consistency in classroom software [40].

CONCLUSION

This study has provided insights into the types of questions that instructors ask on a community-based help forum for Canvas,

currently the most popular LMS being used worldwide. We have identified a wide range of topics instructors struggle with when setting up their courses, troubleshooting the software, and in using the LMS to innovate on their course delivery. Our findings also shed light on some of the key difficulties instructors face in transitioning to remote learning as they try to ensure a consistent, customized course experiences for their students. From these difficulties emerge a number of opportunities for LMS designers and researchers to address areas that are less intuitive and streamline the experience of course setup and management.

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