The Learning Loop: Conceptualizing Just-in-Time Faculty Development

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Abstract

As technology advances, the gap between learning and doing continues to close - especially for frontline academic faculty and clinician educators. For busy clinician faculty members, it can be difficult to find time to engage in skills and professional development. Competing interests between clinical care and various forms of academic work (e.g., research, administration, education) all create challenges for traditional group-based and/or didactic faculty development. In this article, the authors propose a new conceptual model, the Just-In-Time Learning Loop, to outline how faculty development may be delivered in a just-in-time format. They propose that faculty developers, especially in emergency medicine, can integrate leading concepts from the technology-enhanced learning field (e.g., microlearning, micro-credentialing, badging) to create new types of learning experiences.

Keywords

Faculty Development, Online, Technology-Enhanced Learning, Microlearning, Micro-credential, Self-Regulated Learning

Introduction

To navigate today's work, knowledge is often accessed 'just-in-time' and through point-of-use resources. Consequently, the way we learn is changing. From Google to Netflix, the ease of searching for just-in-time content has changed the way we access information across the globe, and how we expect that knowledge to be received. Three fundamental changes in technology have allowed for this shift: 1) widely available internet connectivity; 2) broad adoptions of mobile technology; and 3) optimization of information management (e.g., search tools or online knowledge databases) [1–4]. Recently, the Coronavirus Disease 2019 (COVID-19) pandemic disrupted our current practices of teaching and learning, and forced many institutions to identify more effective ways of online education [5–7].

There are many emerging resources to support emergency medicine faculty who are unable to engage in traditional programming, such as online programs [8], webinars [9], or e-modules [10]. Unfortunately, these require a significant time investment and are typically passive, asynchronous modalities [11]. Online faculty development can often have the disadvantage of being a simple translation of existing programs (e.g., archived recordings of sessions, or virtual communities of practice that replace in-person versions) that do not fully harness the affordances of new technologies to truly transform faculty development [11–14].There are trends that exist, however, within the literature that suggest this may be changing [11]. Steinert [15] defines faculty development as "all activities health professionals pursue to improve their knowledge, skills, and behaviors as teachers and educators, leaders and managers, and researchers and scholars, in both individual and group settings." Faculty development should utilize multiple approaches to deliver education. For example, instead of a live small-group discussion, online faculty development may be an asynchronous blog-based discussion of a case [16]. Or instead of trying to target busy clinician educators on the wards during rounds or in the emergency department, a mobile device application (app) can be developed to engage them while at work [17]. Instead of a live course, a digital equivalent may take the form of a Tweet chat [18] on Twitter or an asynchronous chat-based incubator [8]. New approaches to faculty development suggest more personalized and ease of access through the handheld individualized devices [11]

In the wake of COVID-19, which has irrevocably influenced systems of teaching and learning, it is both useful and timely to revisit our perceptions of faculty development for the new post-

pandemic landscape. How might educators successfully reconceptualize faculty development to fit into a just-in-time world? Just-in-Time (JiT) approaches may provide a new set of approaches to deliver faculty development in this environment. In this paper, we propose a new organizing model to define how we can incorporate JiT methods into faculty professional development: the JiTFD Learning Loop.

Just-in-Time Approach: At A Glance

To better define JiTFD, we must first consider several framing questions. First, what is meant by just-in-time? Next, how might faculty development content be best delivered and how might Microlearning and Microcontent be a way forward? Also, how might JiTFD be credentialed and/or assessed? Is there a role for Micro-credentials and/or Digital Badges? How do these components fit together to deliver faculty development? In the sections that follow, we will explore the answers to these questions, which will lead us to a new guiding model, which we have entitled the JiTFD Learning Loop.

The Just-in-Time Paradigm for Education: A Conceptual Model

Merriam-Webster dictionary defines *just-in-time* (JiT) as "a manufacturing strategy wherein parts are produced or delivered only as needed" [19]. Determining JiT of anything (i.e., learning, training) requires comprehensive thinking and analysis. JiT can only be situated for a time period where everything is in place to readily access the content desired. Educationally, JiT has had several names, including as Just-in-Time Learning [20, 21], Just-in-Time Teaching [22, 23], Just-in-Time Training [24–26], Just-in-Time Feedback [27]. The various uses of JiT have led to the development of different perspectives of the concept and its applications, where it has become challenging to convey a simple, clear-cut definition of JiT. Nonetheless, these approaches have all aimed to meet specific needs when required and have entailed accessing appropriate resources.

Related concepts in the modern educational landscape are the ideas of 'push' and 'pull' resources: when learners are 'pushed' a specific learning resource, an external entity (e.g., educator) is providing them with information, whereas when learners can 'pull' a specific resource, they must have the ability to quickly access and find the resource independently, on demand [28].

How Might JiT Content be Best Delivered? Leveraging Microlearning and Microcontent

Microlearning delivers short pieces of content, in succession, to learners to help them successfully accomplish course and/or training outcomes over time via small, self-paced steps [29, 30]. First defined in 2004, microlearning has been perceived as a new type of learning to develop the larger learning ecosystem [31, 32]. Microlearning refers to engaging with learning activities that contain integrated, but loosely connected, series of microcontent [31]. Microlearning is focused, self-contained, indivisible, structured and leveraged varied content types (e.g., text, video, audio), depending on the delivery method [33, 34].

To provide better microlearning experiences, microcontent is essential. Nielsen [35] first used the word "microcontent" to draw writers' attention to the need for consistency in allocating names, headers, headlines and subject to electronic information, such as e-mails and web pages. These technical features make microcontent more useful on the end-user level. From finding content to consuming it, users may engage and interact with the microcontent in a short period of time. Today, the term typically refers to a more structured approach to how content should be delivered, rather than the nature of the content itself [36]. Microlearning, therefore, encapsulates and guides overall learning, from identifying a need to delivering the required microcontent. Through a combination of microcontent, it may be possible for teachers to learn new microskills relevant to their practice within minutes, in a just-in-time fashion, rather than the traditional investment of workshop participation, which may take hours. Imagine a new faculty member looking to provide difficult feedback to a trainee at the end of shift. One might imagine that with a good microlearning infrastructure that this faculty member could search for a 3-minute video and an infographic that outlines an approach to coaching that may come in handy, just in the nick of time.

Can JiTFD be Credentialed or Assessed? Leveraging Micro-Credentials and Digital Badges

Since its introduction at the Mozilla Drumbeat festival in 2010, interest in digital badges, or micro-credentials, has increased [37, 38]. An extension to this micro-reward system of badging, micro-credentials offer a new achievement-based learning framework that provides faculty members with a way to build new professional competencies tailored to respective academic

environment. Micro-credentials provide faculty members the opportunity to participate in intensive, self-paced, contextually-relevant professional learning that is directly linked to everyday skills educators or scholars will require [38, 39]. Four key features that are found within the literature define educator micro-credentials: competency-based, personalized, on-demand, and shareable/verifiable [39, 40].

Digital micro-credentialing has been embodied in the use of digital badges to explain, verify, identify, and define the learners' skills, expertise and capabilities [39, 40]. With several institutions embracing a digital badge system for their students, the use of micro-credentialing and related digital badges is gaining traction worldwide [41]. Similarly, health care education increasingly utilizes digital badges for competency-based, learner-centered education [42]. This may also be true for peer learning at the faculty and trainee levels [43]. LinkedIn, for example, provides an interface for displaying certifications, including digital badges. Claiming a digital badge and sharing one's micro-credentials on a user profile provides a way of demonstrating one's skills and achievements to the larger community. Digital badges, with their respective content and context, are open to the world and can be verified with a single click on the certification provider's link (e.g., Badgr, Credly).

How do Components Fit Together? The Learning Loop of JiTFD

Our organizing model is the concept of the Learning Loop of JiTFD. Once the need for faculty development is identified, either through an intrinsic trigger (i.e., self-identified need sensed by the educator) or extrinsic trigger (i.e., opportunity for improvement that is shared to the educator by an external source), three parameters are required to ensure JiTFD can take place: 1) existence of microcontent; 2) engagement in learning through microcontent (microlearning); and 3) assessment via micro-credentialing. Figure 1 depicts our conceptualization of how JiTFD may occur.

Figure 1. Learning Loop of Just-in-Time Faculty Development Program

The learning loop starts with a needs assessment that detects perceived faculty needs (i.e., when a faculty member has identified what to learn) and unperceived needs (i.e., when a faculty member does not see clearly the learning needs initially, but still makes a decision for where to begin). These concepts are explained in detail later in the paper. Once a need is identified, faculty can access or receive the content for their established need. The former technique can be described as the 'pull' action initiated by the faculty, whereas the latter is called the 'push,' in which content is directly delivered to faculty through a variety of channels (e.g., mobile notifications, emails). The content is designed as microcontent to support microlearning in small steps, and eventually yields a micro-credential. Achieving a micro-credential suggests the successful completion of a learning loop, which can provide the faculty member with positive feedback on progression towards their specific goals. For instance, the simple reminder of the learning objective and/or identified need initiating the learning loop could serve as feedback. On the other hand, unsuccessful attempts to finish the learning loop should be addressed in the microlearning step. When faculty fail to complete a microlearning step, faculty should be provided with alternate solutions to their needs, such as supportive content (e.g., online resources, further readings) for further exploration. The loop then starts over to identify the next developmental need.

Challenges and Opportunities with Just-in-Time Faculty Development

If we are to successfully incorporate JiTFD into formal programming, there are several key considerations we must first consider. Below we explore four scenarios that highlight specific knowledge and skills that faculty developers will require when integrating JiTFD into the microlearning space.

1) Despite wishing to learn something new or reviewing a specific topic, faculty members have busy schedules and may not have the time to attend professional development sessions. For example, a new faculty member may wish to prepare for teaching in a virtual clinical environment and may decide to review methods for effectively teaching in new patient care settings. Consequently, faculty development and JiTFD must be congruent and compatible with their lives (e.g., bite-sized, mobile adaptable/retrievable, and easily searchable)

- Core content for faculty development has expanded. There is a need to assure that the scope, content, and frequency of faculty development programs appropriately align with the principles of learning [44]. Attention to cognitive load, by dividing content into smaller chunks, will likely result in the successful completion of faculty development programs [45].
- Another challenge of the traditional approach pertains to the scope with which content is relevant to the faculty participant. Content may not be congruent with their area of need at a specific point in time. Combined with limitations in time and availability, faculty may feel that faculty development programs are not relevant and/or a good use of their time, especially as they balance both academic and clinical responsibilities.

2) Faculty have different priorities and diverse interests. We must find a way to deliver content to faculty that they will value and find applicable to their responsibilities. Optionality should be embedded in faculty development programming to foster faculty autonomy and self-determination [46].
    - Faculty development is core to knowledge and skills that support scholarly productivity. Literature on faculty development emphasizes and stresses the development of faculty as educators, researchers and scholars, and leaders and administrators [47]. Formal and/or informal in-group and/or individual settings have been used to carry out these developmental interventions [48].
3) Faculty may not always be cognizant of what they need to learn. We must harness the power of 'big data' and analytics to help faculty better identify their unperceived learning needs, and provide them with the support to address them. Performance analytics and tools, such as the Interfolio [49], can help highlight unperceived needs (e.g., their ability to provide effective feedback) and then provide them with content, just-in-time.
    - Just-in-Time learning demands that learners are able to self-regulate their learning in real time. To our knowledge, there are few resources to support faculty who want to refine their abilities to be self-regulated learners (SRL) [50]. Similarly, faculty development programs have not been designed to formally link to SRL

skills. Our JiTFD conceptual model builds on SRL and leverages it as a means for ongoing professional development.

4) As humans, we are not effective at assessing ourselves and perceiving personal development gap [51]. Our ability to self-assess and self-regulate benefits greatly from several "push" strategies for FD:
    - Provide a menu of resources, distributing content in continuously available manner (e.g., MacPFD.ca has created a video archive by content type, similar to most streaming services to allow faculty to surf through resources [52]);
    - Fold content into larger programs (e.g., a mandatory orientation app that guides you through several use cases and highlights various needs you may have as a faculty member);
    - Peer- and/or mentor-based recommendations for collaboration on the development of new content, which can introduce a social learning element to FD.

Considering the aforementioned, a novel model for faculty development must describe how faculty thrive in today's world. Self-regulated learning is critical at adult education while issues on identifying learning need and finding resources for that need could be challenging. The model suggests continuous professional development, as identified performance gaps are continuously addressed with needed content. Similarly, it affords institutions the opportunity to nurture their faculty across the lifecycle [53]. We have yet to capitalize on a meaningful usage of technology to augment faculty development.

In academic medicine, many of our clinician-educators have limited availability for professional development outside of their daily clinical and academic duties. Identifying effective strategies to engage this advanced learner can be difficult if one is seeking to rely on in-person workshops, especially with the looming uncertainty that surrounds these events with rapidly evolving public health recommendations related to the pandemic. Even when workshops are offered virtually (i.e., on Zoom) and space is not a logistical consideration, the ability to find a synchronous time that considers participants' availability may be daunting. It is incumbent upon faculty developers to think of ways that will engage busy, frontline clinician educators and academics in formats that may best fit into their lives [54–56]. Adopting a design-thinking [55] or design-based research [57, 58] approach that positions the user (i.e., the faculty member) at its core may be

best suited for this purpose. By using these user-centered design methodologies, faculty developers will be able to create new strategies for building accessible and useful resources that support faculty member growth throughout their careers.

Delivery Systems and Technology that will Enable JiTFD

Since online learning can dominate the learning process, JiTFD providers should enable mobile app use on learning management systems (LMS) in order to provide better ease of access to the content with a single tap on a mobile device. Mobile access to content and push notifications of a mobile devices may support heightened engagement in the learning loop. In this way, online tools can become the cornerstone for JiTFD, as all logs and records are collected and aggregated in the system and reused for the components of the model.

Using technology to support JiTFD is essential. While we acknowledge the influence of technology acceptance and the diffusion of innovation [59, 60], JiTFD is possible while targeting common approaches that we use daily. Table 1 defines and explains technological tools that would naturally support JiTFD. While this list can be enhanced with the latest technologies and devices, we would rather focus on how to harness technology to support teaching and learning in the context of JiTFD. Therefore, the list represents a general description and example of the platforms immediately available to faculty developers.

Limitations

Technology is an integral part of JiTFD. The JiTFD Learning Loop is a new model that links key technological advancements that enable technology to enhance microlearning and tracking in education to the traditional field of faculty development. We acknowledge that technology availability and use may not be feasible for all. On the other hand, the use of technology for online learning during the COVID-19 pandemic illustrated how technology helped us adapt to a new paradigm for teaching and learning - when it was quickly needed globally. Therefore, it is conceivable that technology could be adapted to enhance faculty development and inform faculty developers with more optimal strategies to support faculty across the life cycle.

Available resources need to be repurposed for JiTFD to provide cost-effective solutions. The free open access medical education (FOAM) movement is universally present in continuing

professional development [61–63] and postgraduate medical education [64–67], with several notable initiatives and faculty development resources (e.g., KeyLIME podcast [68], International Clinician Educator's Blog [69], Academic Life in Emergency Medicine's Medical Education in Cases Series [16], the MAX FacDev initiative [70]). While robust resources are available, the use of the resources in a formal JiT environment is limited. The FOAM trend must be properly acknowledged, rewarded, and promoted in the academy to allow for sustainability over time [61, 71, 72] and resources must be periodically repurposed for JiTFD. Similarly, on the technology side, we can operate within the open access software movement to decrease the cost of repeatedly developing technological tools by collaborating and sharing platforms where content can be co-created. In the process, this can prompt faculty developers to share knowledge and skills while lessening the burden of time and money as they support JiT and successful learning loops.

Conclusion

The authors define the Just-in-Time Faculty Development model to introduce a new approach to meet faculty teaching and learning needs and to set boundaries for this wide, yet frequently underrepresented, concept in the field of health professions education. Integrating these concepts into faculty development programs for emergency medicine are especially important due to the specialty's relative new status within the house of medicine and its reputation as a leading-edge specialty with regards to digital learning.

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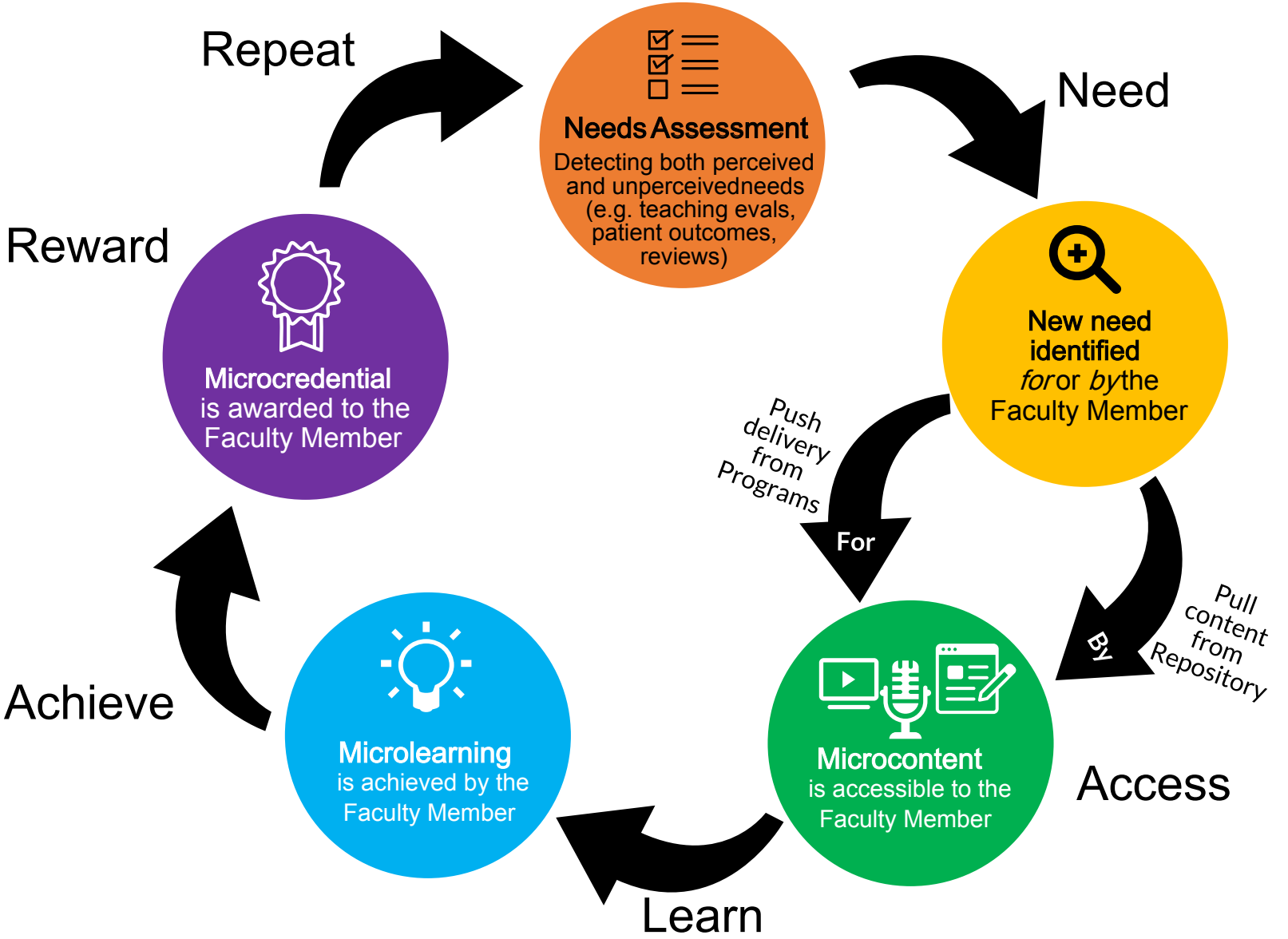
Table 1. Educational Technology that will enable JiTFD

Technological Support	**Role**	**Example Platforms**	**Example of Implementation**
Learning Management System	• Provides an all-in-one platform to house learning content and faculty members with their progress in their learning.	• Moodle • Canvas • Sakai • Blackboard • WordPress • D2L • Coursera	https://fac.dev
Mobile Application	• Supports ubiquitous learning, easy of access, and • Track user behavior and determine just-in-time needs and time slots	• LMS's mobile applications • Apps on mobile phones (e.g., web browser, calendar, social media apps)	JITT Infographic App
Social Media	• Share content through online platforms and raise awareness for a content	• Twitter • Facebook • Instagram	#MedEd and #FacDev Hashtags on Twitter
Advertisement	• Develop keywords for the content and attract attention across the website for content that faculty potentially search	• Google AdSense • Facebook Ads	BI Norwegian Business School https://www.bi.edu
xAPI and Learning	• Store learning activity across the platforms	• IMS Global • Rustici LRS	National Health Service (NHS -

Record Store		• SCORM Cloud LRS	The UK) Kaltura
Digital Badges	• Reward learning and achievement with a graphical identification emblem that can be displayed	• Badgr • OpenBadges • Credly	Interfolio LinkedIn


Repeat
Needs Assessment
Detecting both perceived and unperceivedneeds (e.g. teaching evals, patient outcomes, reviews)
Need
New need identified
*for*or *by*the Faculty Member
Push delivery from Programs
For
By
Pull content from Repository
Microcontent
is accessible to the Faculty Member
Access
Learn
Microlearning
is achieved by the Faculty Member
Achieve
Microcredential
is awarded to the Faculty Member
Reward