Just-in-Time Continuing Education: Perceived and Unperceived, Pull and Push Taxonomy

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Abstract We live in a world where "just-in-time" (JiT) methodologies are increasingly used. Continuing professional development (CPD), including faculty development, has the opportunity to leverage online technologies in a JiT format to further support learner engagement and program sustainability. In this article, the authors propose a model that can serve as a taxonomy for defining and implementing JiT continuing education (JiTCE). The anatomy of JiTCE describes four mechanisms to address CPD needs and delivery procedures: perceived and unperceived, as well as pull and push (PUPP) taxonomy. JiTCE PUPP taxonomy defines four components for designing and developing a program with JiT: on-demand learning, subscription-based learning, performance feedback–driven learning, and data-driven learning. These methods, as backbones, use various online technologies, which offer fundamental support for JiTCE. Delivery systems and technologies are provided as specific examples for JiTCE throughout the article. JiTCE introduces a novel taxonomy to meet continuing education needs and provides an organized approach to design and deploy programming in a sustainable way. Online technologies are evolving everyday and are an indispensable part of both clinical practice and medical education. Pull–push and perceived–unperceived axes can help guide new opportunities for instructional designers and curriculum developers to leverage best practices to align with CPD offerings, which include cutting-edge technologies.

Keywords: continuing professional development, continuing medical education, faculty development, digital learning, technology-enhanced learning

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PROBLEM STATEMENT

Clinicians in the health professions routinely rely on point-of-use information to support just-in-time (JiT) learning. This relationship is often observed in the clinical learning environment, where it is quite common for individuals to consult with JiT

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resources to supplement learning and practice in the workplace.[1,2] To a certain extent, this trend should transfer to all learners, inclusive of faculty regarding their continuing professional development (CPD). The mainstay of CPD education, however, still takes the form of workshops and live events.[3–5] Faculty learners who are available to attend live workshops can enhance their knowledge, skills, and attitudes significantly[6,7]; but those who cannot attend these events risk falling behind their peers. Learners (especially those who function as faculty with academic health sciences centers) often juggle various competing roles and interests (eg, clinical workload, research, and academic travel); therefore, it is no surprise that live, synchronous continuing education and development programs often fail to reach intended audiences. Online CPD programs, on the other hand, lack guidance for robust design and evaluation,[8] and this results in narrow assessment and evaluation for knowledge, behavior, confidence, skills, and attitudes.[9,10]

In the world of CPD, educators and leaders are often asked to consider both their perceived and unperceived needs.[11–14] Often in continuing education, practitioners do not necessarily know what they need to learn.[15] Furthermore, practitioners may simply not know what they do not know. The paradigm of needs assessment is twofold: perceived needs and unperceived needs. Although the former focuses on subjective needs where one can identify his/her/their learning gaps, the latter deals with objective needs where CPD offices act on these gaps to develop responsive educational programs.[11,15]

In today's digitally enhanced world, many technologies now exist to create ways in which unperceived and perceived needs can more easily be identified and addressed. Who has not clicked, at least once, on the most recent suggestion from a Google Ad or a Netflix recommendation? What, then, could the

world of CPD (inclusive of faculty development) look like if technologies to better encourage engagement in new learning opportunities were harnessed? First and foremost, one of the most important steps of CPD development is to identify practitioner needs effectively, accurately, and timely—at the individual or cohort level. Unfortunately, however, the methods defined in the literature lack effectiveness, accuracy, and timeliness, dampening CPD offices' efforts to create and prioritize programs in a timely fashion. In this article, the authors introduce a taxonomy to describe the perceived/unperceived push/pull (PUPP) needs that can support the implementation of JiT continuing education (JiTCE) delivery.

SOLUTION: PUPP TAXONOMY

Anatomy of a Digital JiTCE Program

Faculty learners differ in how they consume professional development opportunities. The authors suggest the PUPP taxonomy: a simple 2 × 2 table that helps developers consider the types of offerings they might incorporate in a JiTCE program. Figure 1 addresses learner readiness in various ways and suggests new directions for development needs. The taxonomy aims to help those who are in the CPD conceptualize how they might enter the JiT CPD domain.

For example, learners may be aware of their own developmental needs, but they may not identify and feel an improvement when they reach a certain level of competence in a specific subject domain (eg, providing learners with feedback). Learners should be actively engaged in their learning process. Many CPD learners will perceive themselves as independent learners and feel that they already know what they need to know and should be prompted to access specific information only when they face an

unknown. Although determining learning needs is challenging, recent advancements in online technologies can help track CPD learners' performance and provide insights for future learning. The allocation for a JiTCE program within our taxonomy is based on two simple categorizations: (1) perceived versus unperceived needs and (2) pull versus push content. Figure 1 displays the four mechanisms for delivering JiTCE content. Each field of the PUPP taxonomy is explained in detail below.

On-Demand Learning: Perceived Needs Met by a "Pull" Mechanism

On-demand learning within the JiTCE model describes a mechanism where learners have identified a perceived need, after which they can "pull"—or access—relevant content that suits their particular needs at a specified point in time and for a particular context. This may range from microcontent to more extensive resources, depending on the level of need and the time available. Creating microcontent that points toward key literature or resources for more extended learning is critical. Microcontent can then serve as a preview for the learner, allowing her to pursue that resource for a specific learning situation or refine her search to identify a resource that is more congruent with her learning need.

To make on-demand learning possible, CPD learners must embrace a mindset of being willing to learn. Learners must also know what they wish to learn. The system to support this type of learning would be an easily searchable microcontent repository, which would allow for successive, and linked, microcontent that can be built toward a microcredential in a specific topic area.

The key principle to on-demand JiTCE is that the content must be easily and quickly available once a learning need has been identified.[16] For on-demand learning to occur successfully,
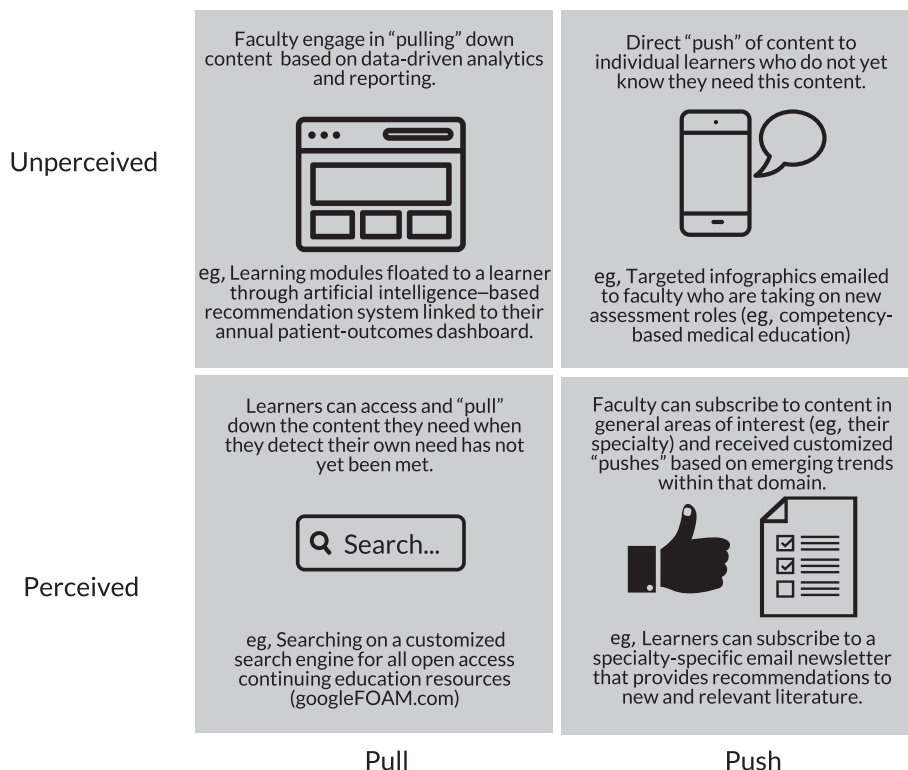

Unperceived

Faculty engage in "pulling" down content based on data-driven analytics and reporting.

eg, Learning modules floated to a learner through artificial intelligence–based recommendation system linked to their annual patient-outcomes dashboard.

Direct "push" of content to individual learners who do not yet know they need this content.

eg, Targeted infographics emailed to faculty who are taking on new assessment roles (eg, competency-based medical education)

Perceived

Learners can access and "pull" down the content they need when they detect their own need has not yet been met.

Q Search...

eg, Searching on a customized search engine for all open access continuing education resources (googleFOAM.com)

Faculty can subscribe to content in general areas of interest (eg, their specialty) and received customized "pushes" based on emerging trends within that domain.

eg, Learners can subscribe to a specialty-specific email newsletter that provides recommendations to new and relevant literature.

Pull   Push

FIGURE 1. Perceived/unperceived push/pull taxonomy of just-in-time continuing education

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TABLE 1.				
Requirements to Enable JiTCE				
JiTCE Delivery Mechanism and Example	**Faculty Readiness**	**Tech Requirement**	**Faculty Development Example**	**Continuing Health Profession Education Example**
On-demand (perceived need, pull content)	• Ready to learn • Have time to learn	• Tagged microcontent • Organizing website or portal • Searchable resources	• MacPFD.ca • search.facdev.org • JiTT Infographics	• CanadiEM.org blog • Health informatics, quality improvement, and patient safety (hiqips.org)
Subscription-based (perceived need, push content)	• Motivated to learn broadly with new content	• Delivery mechanism (eg, podcast channel, email newsletter subscription signup and delivery, and ability to "follow" on social media)	• KeyLIME podcast keylimepodcast. libsyn.com • MacPFD blast newsletter—www. macpfd.ca/home/macpfd-blast-newsletter	• EM:RAP podcast • Emergency medicine cases newsletter
Performance feedback–based (unperceived need, pull content)	• Curiosity—willing to just click and check out the content • Time to learn	• Constant cycling of content that is set to be discovered when needed • Academic "clickbait"—small amount of microcontent that is written in an enticing way to solicit click-throughs	• Google Scholar–recommended articles • Scrolling through a Twitter hashtag (eg, #MedEd) for new, unfamiliar content • A faculty performance report card with recommendations for areas of improvement that they can discuss with their associate chair of education	• Scrolling through a Twitter hashtag (eg, #FOAMed) for new, unfamiliar content • A clinical dashboard that recommends some possible areas for improvement that the end user then goes to research and learn on their own.
Data-driven (unperceived need, push content)	• Willingness to learn • Ability to intake new information (eg, cog load cannot be too high; do not push a notification to surgeon mid-operation)	• Use AdSense(ish) tools to create need • Sample scenarios to make feel the need for FD	• Mendeley suggested article alerts based on one's personal library	• Recommendations for courses/modules within massive open online course platforms such as Coursera

EM;RAP, emergency medicine reviews and perspectives; FD, faculty development; JiTCE, just-in-time continuing education.

learners must be able to access the content when they need to complete a specific task or when they need new information at their fingertips.

For instance, when a faculty member is immersed in a situation where he is required to write multiple-choice questions (MCQs), he may choose to consult best practices and/or guidelines to write optimal MCQs. This faculty member is likely to search for "How do I write good MCQ questions?" in their search engine of choice.

CPD offices should be prepared to meet emerging CPD learners' needs. Technologies that would assist in this pursuit would allow for customized search engines.[17] Faculty developers would need to create content that is well-optimized for Google and/or YouTube because many learners readily use these resources to access information when they first identify a need. Creating web portals for CPD learners that are tailored to their needs may also be another mechanism to help them discover on-demand content (eg, menu of content they can scroll through). Wikis[18] or other rich repositories (eg, the Association of American Medical Colleges' MedEdPORTAL) may also be of great benefit.

Subscription-Based Learning: Perceived Needs That Are "Pushed" to Learners
As learners become more frequent users of JiTCE, learning analytics could be leveraged to suggest more content to the learners (eg, akin to push notifications). Learning analytics of learners could be performed by a learning management system (LMS), which could analyze and identify learning behaviors of the learners based on various parameters of their learning experiences (eg, location, learning history, and search history). The LMS system can then start to push microcontent to learners through mobile notifications or email for immediate use. An

example of this might also be an email newsletter to which individuals could subscribe and receive weekly/monthly content to their inbox.

Similarly, learners could select items they would like push notifications for, such as feedback skills, test-item creation, and bedside teaching. This would then build on the perceived needs/pull mechanism previously described.

Performance Feedback–Driven Learning: Unperceived Needs That Prompt Pulling New Information
In this scenario, a learner does not specifically know what they need to learn, but they are willing to learn. Learners are provided with development topics that are in popular demand that are identified by other counterparts in the institution, specialty, or practice.

For instance, learners in Canada who wish to opt into this mechanism could self-enroll in a mobile or web application (app). Based on user input, this learner might then receive notifications that other individuals with comparable positions are also reviewing content related to Competency by Design (CBD). Based on data from collective searches about CBD for faculty development across Canada, the system would then recognize this demand, and suggest CBD microcontent, from basic to advanced content, to all learners enrolled. Similarly, a forward-facing academic hospital may wish to link clinician dashboards to an LMS that would allow practitioners within their hospital to immediately be given learning recommendations based on their actual patient-oriented and patient-centered outcomes (eg, low Press Ganey score triggers recommendations for communications courses). Learning progress by learners are analyzed and customized accordingly to assist those within the system discover additional resources.

Data-Driven Learning: Unperceived Needs That Identify Push Content for Learners

This component represents the most challenging CPD component of the model. This refers to those learners who do not perceive the immediate need for further development, but could be pushed content that they did not realize they needed. Essential to this component is the flow of information from a third-party source to highlight a need (eg, faculty evaluations and annual performance reviews). The latter data would inform the content that would be pushed to learners. In addition, the system could potentially send microcontent for trending topics; this represents a user-driven approach for popular topic generation through email or push notifications. The system would aim to get attention from the learners using microcontent and inform the learners on what is current within the realm of CPD.

If, for example, a specific clinical faculty does not provide feedback to their trainees in a certain clinical space, the integration of "push" content to the learner for this unperceived need may help provide instruction and even prompt behavior change that can be observed or reported by the learner. Similarly, a clinical leader who receives poor performance reviews about their communication style in a crisis (supervisor reports, 360 evaluations, and patient complaints) may have a recommendation for a crisis communication course floated their way within either an LMS or in a custom newsletter. Resources integrated into the clinical environment to augment feedback delivery (eg, a scrolling screensaver on a hospital computer with an infographic about how to give evidence-based feedback) would also be highly useful. In this example, it is not incumbent for learners to know that they require a nudge toward better feedback practices, but rather, this need is informed by group-level data (eg, aggregated resident/student feedback and aggregated clinical performance data). JiTCE can also be deployed to individuals to improve their feedback, in the moment, at the time when they have observed a trainee and need to provide feedback or engage in JiT feedback from other practitioners on a team about their interactions with patients in certain contexts (Table 1).

Similar to the rest of health professions education,[19–21] there is great potential in the future to harness the power of "big data" by using artificial intelligence analytic techniques (eg, machine learning and natural language processing) to augment recommendations for CPD experiences akin to the way Amazon recommends products or Netflix recommends movies to their clientele. However, these types of analysis are quite "data hungry" and require extensive databases to manifest results. Harmonized databases and platforms (eg, aggregating CPD online offerings within a single repository similar to OpenCourseWare [OCW]) would be helpful in helping to achieve this possible future.

Considerations for Implementation

When we first conceived of this idea, it was in the prepandemic period where we did not yet know the dramatic shift that would be induced by the Coronavirus Disease 2019 pandemic. In the post–Coronavirus Disease 2019 era, we have been thrust into a newly digital world, with a wide variety of strategies that have been used to change and adapt existing continuing education for the future. Although most health professionals are certainly more familiar with technology use now, many of the techniques described in the PUPP taxonomy are still fairly advanced and may still be outside of the comfort zone for many users, educators, or developers in the CPD domain. Moreover, there will need to be significant investment into digital infrastructure, technical capabilities, and continued resourcing that will be required to create and maintain the microcontent and LMS to support this type of learning endeavor.

Although it is certainly within the wheelhouse of CPD educators to adopt a growth mindset for learning new techniques, when designing modules and development experiences, it will be important to consider the technical familiarity of the target audience and to invest heavily on the user interface of these resources and modules. Mindset will be especially important when considering entering into the analytic-driven development domain because most CPD offices are not yet commonly deploying dashboarding, big data-savvy artificial intelligence techniques (eg, natural language processing and machine learning) within their current programming. To truly capitalize on the potential learning opportunities, CPD offices will need to join forces more with their hospital and clinic-based partners to interface large patient-oriented data sets (eg, outcomes databases and patient satisfaction) and operational data sets (eg, ward length of stay, operating room turnaround times, and emergency department wait times).

Because of the high level of coordination required for acquiring or linking to data for generating unperceived needs, it may be prudent for CPD leaders to begin with more easily attainable approaches within our taxonomy. For instance, beginning with push strategies that are familiar (eg, email subscription) may be prudent, building toward new ways of facilitation later on.

CONCLUSION

The PUPP taxonomy can guide new opportunities for educational developers to leverage best evidence into CPD offerings, while making the best use of cutting-edge technologies. Current practices of online technology and tools in our daily lives accomplished custom-tailored methods of predictions and suggestions for what to click, watch, and follow next; PUPP taxonomy has the potential to achieve similar approaches within the CPD area while targeting needs of professionals.

Lessons for Practice

■ The PUPP model can guide new opportunities for educational developers to leverage best evidence into CPD offerings.

■ On-demand learning, subscription-based learning, performance feedback–driven learning, and data-driven learning open up new perspectives to CPD, Continuing Medical Education, and faculty development to offer and deliver education in various formats.

■ Accepting technology and investing in implementing the PUPP model may require some technical support and infrastructure.

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