Integrating the educational technology expert in medical education: A role-based competency framework

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Categories: Education Management, Medical Education (General), Technology

Abstract

Even though educational technology has existed for decades, integrating educational technology into the medical curriculum has just recently come to the forefront as a priority for the Royal College of Physician and Surgeons of Canada. The process for how this integration will occur has yet to be defined. Therefore, a competency profile was developed for the educational technologist, comprising seven roles, based on the authors' and collaborators' professional knowledge and experience, along with a scoping review of the literature.

The result is a hybrid framework of seven core roles constellated around a central role of educational technologist, similar to the CanMEDS model. The proposed roles are: Educational Technology Expert, Leader, Educator, Administrator, Developer, Designer, and Collaborator. Each role has a definition, list of competencies and example activities. A description of each role is provided, along with key concepts highlighted. This newly proposed roles' framework is readily identifiable to the medical educator familiar with CanMEDS, and is presented to facilitate integration between medical educators and educational technologists.

The model presents a familiar humanist lens through which to view educational technology. Using the MedEdPublish platform for dissemination of this work, ongoing dialogue regarding the proposed framework, particularly regarding its roles, content, and applicability, is greatly encouraged in the reviews' section.

Keywords: Educational technologist, Roles framework, Academic technology

Introduction
Educational technology has been defined by the Association for Educational Communications and Technology (AECT) as "... the study and ethical practice of facilitating learning and improving performance by creating, using, and managing appropriate technological processes and resources" (Hlynka and Jacobsen, 2009). This is in contrast to information technology (IT), which is defined "as the technology involving the development, maintenance, and use of computer systems, software, and networks for the processing and distribution of data" (Merriam-Webster online, 2017). Despite having remarkably different roles and domains, the two are commonly used interchangeably, in error.

Even though educational technology as a domain of practice and study has existed for decades (Saettler, 1967), integrating educational technology into the medical curriculum has just recently come to the forefront as a learning priority for the Royal College of Physician and Surgeons of Canada (RCPSC). Their CanMEDS Roles Framework consists of seven core competencies that a practicing physician needs to acquire by the end of clinical training: medical expert, communicator, collaborator, leader, health advocate, scholar and professional (Frank, Snell, Sherbino, 2015). The CanMEDS eHealth Expert Working Group Report revised CanMEDS 2015 to integrate technology competencies across the all Competency Roles, an acknowledgment of the substantial role technology plays in all domains of the clinician's practice (Ho, Ellaway, Littleford, Hayward, and Hurley, 2014). This group examined each of the CanMEDS Roles "through the lens of eHealth to provide advice and guidance," in order that resident physicians and medical educators consider technology as an integrated part of medical practice (Ho et al., 2014).

This paper presents a lens for the medical educator to view educational technology, i.e. to consider possible professional roles for successfully navigating educational technology systems, tools, services, and processes. It further proposes a framework that supports a more interdisciplinary approach to medical education, while shedding light on the field of educational technology for medical educators facing these and other challenges.

**Literature Review**

In 2000, Bates identified the "lone ranger" in education as the teaching faculty member developing material on his/her own without professional staff support. Bates (2000) associates the "lone ranger" approach with poor use of faculty time, loss of opportunities for integration, and a lack of technological sustainability. Along the same lines, Schneider (2009) challenged design-oriented educational technologists to "adopt an interdisciplinary approach that will ultimately lead to better pedagogical designs in a given area," along with a "humanistic approach [that] recognizes the individual learners…" and the belief that "[instructional design] procedures can be effective for either an academic or a training situation."

Schneider's interdisciplinary approach, however, was not reflected in the Future of Medical Education in Canada's Report entitled, Information and Educational Technology in Postgraduate Medical Education (Ellaway, Topps and Bahr, 2011). In their review, Ellaway, Topps and Bahr (2011) found that the adoption of digital media and methods to be very uneven, and they identified a number of serious issues related to technology, including medical educators in Postgraduate Medical Education (PGME) developing and innovating in silos, rather than collaboratively. They called for "better standards" as a way to remediate challenges related to quality and process in PGME. However, notably absent among their recommendations was enhanced interdisciplinarity in medical education with educational technologists, missing the need to work collaboratively altogether. Even the very title of the report conflates IT and educational technology.

Medical educators are not alone in this confusion around how technologists can be of assistance in delivering high
quality medical education. Educational technologists may also think of their job in a relatively limited way. For example, Ritzhaupt, Martin and Daniels' (2009) educational technology profile is focused on specific skills and technologies. This approach gives a very fragmented picture of the profession. At the same time however, the Association for Educational Communications and Technology (AECT) points to high level processes and values, and not simply hardware and software (Hlynka and Jacobsen, 2009, quoted above). Han, Resch and Kovach (2013) echoed the AECT definition, and argued that "educational technology should be valued in terms of how well the technological process informs and facilitates learning." This connects an expanded and evolving view of educational technology with the world of medical education.

Meanwhile, approaches to delivering high quality education involving technology continue to expand. In regard to resource development, one important change has been the emergence of user-created content. As noted by Hlynka and Jacobsen (2009), "the contemporary convergence of [content creation] tasks is one of the major characteristics of the first decades of the 21st century, for better or for worse. Anyone can produce a video for YouTube; everyone is their own editor." The implication is the medical educator working today (un)knowingly takes on multiple roles, including Developer and Project Manager, as the YouTube video example implies.

The Designer role may be another. Thinking across the medical educator divide, van de Grift and Kroeze (2016) called for design thinking to augment medical professionals’ skills in basic and clinical sciences with design skills, to be applied in clinical and also medical education contexts.

As a strategy to access rather than possess these content-related competencies, Robin, McNeil, Cook, Agarwal, and Singhal (2011) call for faculty to engage with "a variety of experts [including] instructional design and educational technology, and ...teams composed of e-learning specialists, web designers, and videographers [to] support the design and development of new instructional materials while guiding medical school faculty in the use of new technologies."

In parallel developments, Verma et al. (2009) applied a competency model based on CanMEDS to the regulated and unregulated professions of medical radiation technology, social work, pharmacy, and psychology, and argue for a "cultural shift from discipline-based silos to a common language for ascertaining the skills, knowledge, and attitudes needed to function in interprofessional teams."

The stage is set for medical educators to begin, or continue, to work in a more interdisciplinary manner with educational technology groups already in their faculty who already have the required competencies, but who may be underutilized. This paper presents a role-based framework for educational technology competencies in medical education and is a logical continuation of the existing work, bringing together the fields of medical education and educational technology.

**Methods**

Academic Technologies, in the Office of Education, Faculty of Medicine and Dentistry, at the University of Alberta, is a "faculty-central resource that supports teaching and learning with technology in the Faculty of Medicine & Dentistry by developing educational resources, supporting core systems, providing workshops and training, and collaborating on research and service endeavours with members of the faculty and the wider community" ([https://www.ualberta.ca/medicine/programs/actech](https://www.ualberta.ca/medicine/programs/actech)).

Since the time of Academic Technologies inception in 2012, a continued lack of awareness amongst faculty, as to
the what can be offered in terms of educational technology support, has been continuously observed. It has become clear that time-constrained medical educators are unlikely to read complicated educational technology competency profiles. Connecting the right educational support, with the faculty members who require it, proves difficult in practice.

Meanwhile, it was becoming apparent that the work in academic technologies involved not only competencies but also roles. Working with Canadian physicians, the idea arose of describing educational technology in terms similar to the CanMEDS roles in order to present this work in a format familiar to physicians. The intention was to enable access and integration of educational technology in their teaching and assessment across all levels of medical education. The CanMEDS framework was used as a base model due to its already accepted interdisciplinary status, as evidenced by its uptake in allied health professions, including pharmacy (Canadian Council for Accreditation of Pharmacy Programs, 2006) and occupational therapy (Canadian Association of Occupational Therapists, 2007), among others. It is not necessarily an endorsement of the CanMEDS framework.

Therefore, a competency profile was developed for the educational technologist comprising seven roles, based on the authors’ and collaborators’ professional knowledge and experience, along with a scoping review of the literature. The search strategy included the databases of ERIC (on OVID), PubMed and Google (first ten pages) and included the terms: (“educational technolog*” OR “instructional technolog*”) AND (“medical education” OR “clinic* education”).

To enhance the literature search, the next step was consultation with educational technologists, academic faculty and medical educators, as the prime purpose of the model was to raise awareness and dialogue rather than define the roles and competencies authoritatively. The roles and competencies are, thereby, rooted in extensive practical experience. Further group consultation with local educational technologists and academic medical educators refined the proposed framework until consensus was reached.

Results

Hybrid Structure

Based on our findings, a hybrid structure of seven professional roles constellated around a central role of educational technologist emerged. The structure is adapted with permission from the CanMEDS diagram and framework (used by permission from the RCPSC).

The proposed roles are: Educational Technology Expert, Leader, Educator, Administrator, Developer, Designer, and Collaborator. Each proposed role has a definition, list of competencies and example activities. A description of each role is provided along with key concepts highlighted.

The role definition follows CanMEDS closely, highlighting professional values and aspirations. Collaborator and Leader roles were retained, as was the notion of a central expert role. Since design thinking should be fundamental to all aspects of educational technology, we diverged from the CanMEDS roles to accommodate a Designer role. This is unlike Verma et al. (2009), who used the same Roles as CanMEDS. Furthermore, to better describe our work we used Developer, Administrator, Designer and Educator roles rather than the CanMEDS Scholar, Professional and Health Advocate roles.

We further substituted enabling competencies with "example activities" because
Examples are more concrete, easier to grasp, and less open to interpretation than competencies and thus better for illustrative purposes

They are intended only to indicate the range of activities possible, not required and not necessarily available in a given medical school.

Competencies and example activities come from our own practice, and are consistent with the kind of competencies identified in educational technology frameworks such as Ritzhaupt’s (2009), but are more focused on medical education. (see appendix for examples)

Figure 1. Role-based framework for the Educational Technologist Specialist

Proposed Educational Technology Roles

Educational technology expert

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<th>Definition</th>
<th>Competencies</th>
<th>Example activities</th>
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Educational Technology Experts support the goal-oriented and ethical use of technology in medical education, by applying technological, pedagogic and interpersonal skills and professional values.

<table>
<thead>
<tr>
<th>Identify, monitor and address faculty's needs related to medical education</th>
<th>• Evaluate emerging software and devices as they pertain to medical education e.g. PGME</th>
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<tr>
<td>Facilitate the use of technology in teaching and learning</td>
<td>• Demonstrate technologies</td>
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<td>Be faculty’s first point of contact concerning educational technology</td>
<td>• Troubleshoot</td>
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<td></td>
<td>• Share information and ideas about effective integration of educational technology with faculty, with colleagues, with other institutions</td>
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<td>• Follow relevant tech trends</td>
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As Educational Technology Experts, educational technologists translate knowledge of effective and appropriate kinds and uses of educational technology to teaching faculty and others. Needs discovery is central to providing good service: this involves questioning assumptions ("Why do this and not that?") to uncover underlying goals. It moves to shaping strategies ("How to do and how not to do X..."). Although we use technology, the educational technologist is not "in IT." IT as a domain has significantly different competencies, methodologies, and values. Ed tech is not IT.

**Key concepts**: needs discovery, troubleshooting, empowerment, change agent, best practices, technology integration

## Educator role

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<th>Example activities</th>
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As Educators, Educational Technologists demonstrate a lifelong commitment to excellence in practice through continuous learning and by teaching others according to evidence-based educational practice.

| Identify instructional needs, and support instructional goals | Participate in the design or redesign of face-to-face (f2f), online or blended courses or activities to meet appropriate instructional goals |
| Promote, create, enhance and support effective and appropriate learning experiences and evaluation | Plan and conduct workshops on best practices |
| Question assumptions | Train others in technology |

- Participate in the design or redesign of face-to-face (f2f), online or blended courses or activities to meet appropriate instructional goals
- Plan and conduct workshops on best practices
- Train others in technology
- Work with content to make it clearer, better aligned with objectives, or better suited to take advantage of technological affordances
- Attend lectures in classrooms, visit clinics or wards to understand context for learning
- Participate in scholarly activities
- Talk to resident learners

The educational technologist supports medical education through coaching, training, pedagogic consulting, design, and scholarly work. Typically the holder of an MEd degree, the educational technologist is not a medical educator, but nonetheless may be able to provide valuable expertise and insights into various aspects of the medical education endeavour. **Key concepts:** needs discovery, assessment in medical education, instructional goals, competency-based medical education (CBME), instructional strategies, adult learning, online learning, technology integration, motivation

**Administrator role**

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As Administrators, Educational Technology Experts are committed to the effective and efficient provision, use, and maintenance of technology systems and infrastructure, through ethical practice, high personal standards of behaviour, and accountability to stakeholders.

| Maintain one or more of a: learning management system, video platform, lecture capture system, simulation system, portfolio system, or other system | • Provide day-to-day support of the systems (e.g. user management)
• With programs and user groups, coordinate and provide course roll-overs
• Consult with information technology (IT), vendors, and other groups on integration of systems
• Implement a project management solution |

As Administrator, the educational technologist supports the educational technology infrastructure to provide necessary cohesion, continuity, and record-keeping to support business and educational processes in a medical school. This role could also provide project management oversight.

**Key concepts:** academic year, evergreening, user security, privacy, enrollment

**Leader role**

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<th>Competencies</th>
<th>Example activities</th>
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| As Leaders, Educational Technology Experts engage with others to contribute to a vision of a high-quality medical education system, through their activities as educational technology experts, educators, designers and administrators. | Plan, oversee, monitor and communicate the work activities of self and others Evaluate vendor proposals; monitor and support their work Propose and support relevant initiatives at the unit, faculty or intra-faculty level | • Identify and communicate the unit's goals internally and externally
• Supervise other staff, students or vendors
• Liaise with other support groups on campus (e.g. IT, Registrar,...)
• Initiate a procurement process of a software platform
• Liaise with vendors (e.g. for upgrades)
• Participate on relevant governance and advisory committees
• Create business cases |
As Leader, the educational technologist supports not only operational, but also project activities. In this role, the educational technologist brings attention and strategy to a wide range of issues relating to various aspects (products, processes, procedures) related to teaching and learning through technology, and linking to faculty and institutional strategic goals.

The effective educational technology Leader is an effective Collaborator who discovers synergies amongst stakeholders.

**Key concepts:** needs discovery, institutional organizational units, cost of ownership, reporting cycle, supervision, project management

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### Designer role

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<td>As Designers, Educational Technology Experts contribute their expertise and influence as they work with stakeholders to advocate for and engage in design thinking in medical education.</td>
<td>Discover, document and communicate the needs of users, clients and stakeholders through a variety of formal and informal means. Develop, create and test effective messaging, experiences, artifacts and/or services using appropriate (i.e. goal-oriented, consultative and iterative) methodologies.</td>
<td>• Interview a faculty member and a resident group to identify underlying instructional needs and goals. • Conduct a focus group. • Write a design brief. • Develop personas and scenarios from user research. • Create wireframes, mock-ups, and prototypes. • Supervise students working on design. • Evaluate success according to communicative or instructional goals.</td>
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Of the seven proposed roles and competency areas, design as a goal-oriented, iterative, collaborative process is arguably the least understood and least appreciated by the non-expert.

As Designers, educational technologists engage in design as "...the craft of visualizing concrete solutions that serve human needs and goals within certain constraints." (Goodwin, 2011)

Quality requires effective design process (beyond ADDIE: Analyse, Design, Develop, Implement, Evaluate), and not merely applying "standards" to an end product.

Kinds of design relevant to medical education include: (visual) communication design, information design, learning/instructional design, interaction design and service design, which contain overlap.

Much of patient education, knowledge translation, and course development should be approached as design.

**Key concepts:** needs discovery, project management, communicative/instructional goals, iterative process, prototyping, goal-based evaluation, sign-off, collaboration, ideation, user research, user/stakeholder engagement, participatory/co-design, success criteria, design brief, design strategy
## Developer role

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| As Developers, Educational Technology Experts collaborate to provide all dimensions of quality in the creation, revision, or repurposing of resources. | Participate in one or more of: coding and scripting, editing; course building, pre- and post- video production, other activities | • Create courses in an Learning Management System (LMS)  
• Shoot, edit and distribute video  
• Create an online form to support teaching  
• Add quiz questions to a video  
• Create or edit code or script |

In this role, the educational technologist uses a variety of tools, usually digital, to instantiate or "build out" designs. Separate from the Designer role, the Developer’s work is production-oriented. There is often a project management component in this to be navigated with faculty. Depending mostly on funding and timelines, the Developer role may be taken up by an educational technologist, a vendor, a student, or the faculty member him/herself.

**Key concepts**: success criteria, templates, dimensions of quality, time lines, sign-offs

## Collaborator role

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<th>Example activities</th>
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| As Collaborator, the educational technologist establishes and maintains relationships to work effectively with others to support effective, appropriate learning and assessment experiences. | Discover and support needs within and across organizational units; communicate these needs strategically and appropriately to achieve mutually beneficial outcomes. | • Work with a busy medical educator to produce a resource  
• Dialogue with a colleague from a different unit about a possible area of mutual interest; following up with an email  
• Facilitate student involvement on a project  
• Develop and present a workshop with another unit |

Collaboration is essential for success in the complex, multi-dimensional, multi-player medical education environment. Collaboration often involves project work, committee work and collaborative initiatives

**Key concepts**: roles, adding capacity, synergies, trust, relational practice
Discussion

A new framework

Built upon the CanMEDS framework, this newly proposed roles’ framework is readily identifiable to the medical educator and should facilitate integration and build the needed technological bridges between multiple disciplines.

Integrating educational technology with medical education has been a decades’ long struggle. The roles of Education Technology Expert, Educator, Administrator, Leader, Designer, Developer and Collaborator are now clearly defined, with outlined competencies and example activities for each role.

In our experience, but not well represented in the literature, medical educators and faculty typically require technology support as follows:

- creating/distributing/managing digital assets
- technology integration in adult learning
- patient information design
- vendor relations
- other activities

Armed with this framework, and considering that aspects of all the proposed roles may be applied to each of these challenges, the medical educator may become more readily aware of possibilities: to acquire more competence personally or seek the assistance of an educational technology group. This aligns with Verma et al.’s (2009) assertion "common language using core competencies for health professionals may be used to drive the cultural shift needed to reduce individual liability and to transcend the hierarchy in health care.” The implication is medical educators would do well to bolster their own competencies as needed for the educational technology task, and know when to collaborate with the educational technologist.

Roles mapping onto jobs

An important difference between this educator technologist framework and the CanMEDS framework is that unlike physicians, individual educational technologists are not expected to have all the competencies in all the roles. Furthermore, the list of competencies in CanMEDS is finite, whereas for the educational technologist as envisaged here the list is potentially infinite.

Ritzhaupt et al.’s (2009) educational technology profile listed 40 different knowledge areas, 21 skill areas and 23 ability areas. All of these tasks can be associated with one or more roles; for example, "Cognitive theories of
learning” pairs with Educator, "Interpersonal communication” with Leader and Collaborator, and so on. The difference between our framework and the "traditional" educational technology profiles is the grouping by role provides a higher level categorization than either "generic” Knowledge/Skills/Attitudes, as seen in Ritzhaupt et al. (2009), or by specific workplace skills, such as "using Photoshop” or "using javascript”. Using this framework simplifies the profile into its requisite roles.

This framework helps describe to the medical educator what tools, perspectives and values the educational technologist may bring to the task. When entering a project or teaching situation, it is not expected that the project will be broken down into these specific roles, but the medical educator will be able to describe his or her need in a way that can be better understood by those providing support. By doing so, both parties will be speaking a common language, which will lead to better outcomes, in keeping with the rationale of Verma et al (2009), as mentioned above.

In our experience, the "roles perspective" not only fits the support function of an educational technology group, but also encourages collaboration and empowerment of faculty, and capacity building in the campus community and beyond. The roles perspective pushes beyond "traditional" research roles and "traditional medical education” topics into a new, interdisciplinary space. This area is also ripe for further study.

Connecting "roles" with humanist values

When we consider ourselves acting in a role, we imagine ourselves interacting with other people; for example, as Educator, we interact with learners, evaluators and administrators. Thus roles ground our activities, and competencies, into our human relationships. Medical educators have traditionally thought of technology as part of the teaching toolbox but not integrating with other professionals, systems or resources. We are arguing for these to be integrated and that thinking in roles moves this goal forward. Covey (1989) developed a time-management strategy based on identifying one's own personal and professional roles, as part of a strategy and practice of ethical and principles-based decision-making as being sustainable and effective in the management domain. This could be relevant to operationalizing CanMEDS in physician and medical educator roles.

Medical educators can typically identify the Educational Technology Expert role: demonstrating and troubleshooting software and devices, while following relevant technological trends et cetera. And medical educators may appreciate the Educator and Administrator roles, for example in the development of online learning and providing day-to-day support of systems. What is not readily apparent are the roles of Leader, Developer, Designer and Collaborator. Not realizing these underlying roles, the medical educator struggles and projects tend to go unfinished or take longer than time permits (Bates, 2000; Care, 2001). Collaborating early on projects with the educational technologist can abate frustration and lead to greater technological integration and success, as evidenced by Robin et al. (2011).

Philosophical perspective

"Is it better to be in balance with technology, or for technology to be our master?” This is a serious question at a significant juncture. Evidence is emerging we are not necessarily winning. In 2015 the Alberta Teachers’ Association, in association with Harvard Medical School, reported longitudinal findings (McRae, 2016) of increased anxiety and feelings of isolation associated with the use of technology, albeit along with its known benefits. The
ongoing study is finding that balance with technology in our lives is an overriding concern, especially for teachers.

From our perspective, a key role for any educator in the Western world involves dealing with technology. In 2015 the Royal College introduced technical competencies for residents (Ho, Ellaway, Littleford, Hayward, and Hurley, 2014), but so far for medical educators neither technical competencies nor interdisciplinary roles have been addressed. 

We are arguing for an increased intentionality around the roles we as teachers play with technology. Roles embody our humanist valuing of relationship, roles involve relationships with people in a way competencies don’t. And technology is a measure and a tool of our actual practice. Therefore roles and technology go hand-in-hand, as we consider how we teach and what things mean. It is an invitation to go beyond roles as merely "themes or meta-competencies” (Frank, 1996), rather to identify and reflect on our roles as a means of empowerment of self and others. 

The intention of this paper is to support the empowerment of medical teachers everywhere by supporting ultimately a role-based consideration of medical education.

Applications

Applications of the role-based educational technology profile could have a broad scope:

- For medical educators and educational technologists to have more informed, meaningful and effective interdisciplinary dialogue
- For educational technologists to be hired, be assessed, or self-assess
- For medical educators, educational technologists, and all stakeholders involved in medical education (learners, decision makers) to expand their frame of reference concerning educational technology

Strategies could be devised to support these activities for a more reflective, collaborative, and communicative practice among all those involved in medical education around the use of educational technology.

Arguably the most important application, however, would be at the level of institutional planning. These, and possibly other roles, could be considered when support units are being constituted for supporting medical education. Thus not only can the various competencies be provisioned, but there could be more leveraging of synergies amongst educational stakeholders within the institution to make this happen. This could take the form, for example, of more strategic partnering between design, technology and medical education programs.

Limitations

Although grounded in the existing literature and in our experience as an academic office, this framework does have its limitations.
1. The framework is speculative and based on the experience in only one Canadian academic institution. It has not been validated broadly.

2. Like CanMEDS, this profile is not directly useable for assessment purposes.

3. Institutional, departmental and faculty-level organization and expectations vary widely and this framework may have generalizability issues.

4. A given educational technology support unit may or may not recognize these roles, competencies and activities as being its own, in terms of mandate.

5. A given group may or may not have all the given competencies represented.

Moreover, it needs to be acknowledged the descriptions and characteristics of roles described in this model are highly abridged, and other interpretations are possible. For example, the presentation of the Designer role only touches on key points in this huge field of inquiry and activity, which has its own disciplines and subdisciplines. Much more could be said about all these roles, but not in the scope of this article.

The intended take-away is not the content of the roles and competencies proposed here, but rather the concept that roles can be a useful way for clinician educators to think of and engage with educational technology and technologists.

Next Steps

Despite being surrounded by technology, medical educators struggle with its integration into daily teaching and assessment. With the move to competency-based medical education, and Canada’s Competence by Design, clinical faculty are encouraged to observe, coach, and report, residents in training, but methods for doing this are ever-more technology intensive, as the eHealth Expert Working Group’s work suggests (Ho et al., 2014). As Ellaway et al. (2011) noted recently, "there is a need for improved research, scholarship and critical appraisal of the role of digital media and methods in PGME." This framework may be useful in that appraisal process.

Further studies are needed, of both quantitative and qualitative nature, to explore questions such as:

- the generalizability of these findings
- to what extent exposure to the framework does or does not change the professional practice of clinician educators, educational technologists, administrators, and others
- potential governance and management implications of a role-based competency profile for educational technologists
• and more generally, whether a roles paradigm sheds light on the lived experience of the stakeholders involved with technology in medical education.

Using the MedEdPublish platform for dissemination of this work, the authors greatly encourage ongoing dialogue in the reviews' section about the proposed framework, particularly regarding the details of the proposed roles and competencies, and more general the framework's applicability. This will lead to broader validation and may lead to further study based on the feedback received.

The real test will be to what extent medical educators use the framework to think about their own practice and what roles do they see being relevant.


Take Home Messages

1. The domain of educational technology has a scholarly basis and is fundamentally different from information technology or IT.
2. Medical educators lack awareness of the existence and nature of educational technologist resources within their faculty and university.
3. Educational technologist competencies can be thought of in terms of roles similar to the CanMEDS framework and the roles include: Educational Technology Expert, Educator, Administrator, Leader, Designer, Developer, and Collaborator.
4. Medical educators may benefit from increased interdisciplinarity with educational technologists.
5. This role-based competency model for educational technologists may be of use for different stakeholders in medical education for the development of their own roles framework.
Notes On Contributors

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Bibliography/References

Academic Technologies, Faculty of Medicine and Dentistry, University of Alberta. Retrieved on January 17, 2017 from https://www.ualberta.ca/medicine/programs/actech


Royal College of Physicians and Surgeons of Canada.


https://doi.org/10.1097/ACM.0000000000001195


**Appendices**

**Examples of the Applied Roles Framework**

The following are actual examples of work done in the Faculty of Medicine and Dentistry at the University of Alberta in 2015-16, presented here to illustrate some of the roles and associated competencies at play.

**Educator role**

An educator involved with a group of pediatric rheumatology residents approached us. A conversation with the instructor about the context and goals for this resident learning experience suggested the use of an learning management system not only to deliver content in PDF form, but also to support asynchronous communication among distributed residents with each other and their preceptors. Initially the instructor had not considered written and chat-based reflective components, nor was she clear how this might be implemented.

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<td>Assisting in the creation of an online learning environment enabling</td>
<td>• Clarifying instructional goals and objectives (i.e. reflection, sharing</td>
</tr>
<tr>
<td>residents to develop, reflect and share on pediatric rheumatology</td>
<td>personal experience)</td>
</tr>
<tr>
<td>competencies</td>
<td>• Identifying appropriate instructional strategies (i.e. discussion)</td>
</tr>
<tr>
<td></td>
<td>• Suggesting and demonstrating technical affordances (i.e. discussion forum</td>
</tr>
<tr>
<td></td>
<td>functionality in the learning management system) appropriate to the learning</td>
</tr>
<tr>
<td></td>
<td>task</td>
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</tbody>
</table>

**Designer role**
Educators in Lab Medicine & Pathology and Hematology approached us to design an on-call simulation in transfusion medicine that could be used with learners in an interactive small group setting. The simulation allows learners to practice decision-making by modeling various elements (events, medicines, blood products) on physical cards. The approach allows for a considerable number of different, relevant scenarios to be easily configured on the spot and addressed in role-play with facilitators. The cards also serve as a paper prototype for possible digital development of this resource.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Competencies</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Designing a card-based small group activity that simulates on-call experience in transfusion medicine</td>
<td>Discovering user needs (modeling a specific decision-based cognitive activity)</td>
<td>• Developing, creating and testing effective experiences, and artifacts (the cards, the card-creation tool in a series of iterations)</td>
</tr>
<tr>
<td>Designing a tool that allows subject matter experts to create and edit cards with a high degree of autonomy</td>
<td>• Engaging subject matter experts in participatory or co-design (as opposed to &quot;handing off&quot; to the designer)</td>
<td></td>
</tr>
</tbody>
</table>

**Collaborator role**

At our institution the central information technologies department ("IT") does not currently support a central video hosting solution. Through our work with clients and our scanning of technological developments, we were able to identify this need and initiate the implementation of such a system by collaborating and sharing costs with another faculty.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Competencies</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Sourcing, piloting and launching an online video platform that greatly enhances security and stability, with recording and publishing capabilities</td>
<td>• Discovering needs (through observation of usage patterns and through interactions with student, faculty and admin users)</td>
<td>• Establishing and maintaining relationships to work effectively with others in collaborative initiatives (by partnering with other faculties to initiate a request for proposal, making a selection, and securing funding for a pilot)</td>
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<td></td>
<td>• Supporting needs within and across organizational units (by working with faculty partners to implement the software and develop training materials)</td>
<td></td>
</tr>
</tbody>
</table>

**Declaration of Interest**

The author has declared that there are no conflicts of interest.