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Narrative Review

Communities of practice: An alternative approach to bridging the theory-practice gap in radiography?

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ABSTRACT

Objectives: There is an increasing need to engage with evidence-based practice (EBP) and continuing professional development (CPD) to effectively respond to the current healthcare demands and challenges. This review critically synthesises key knowledge diffusion and implementation theories, with particular emphasis on Communities of Practice (CoPs), a theory as yet unexplored in radiography practice.

Key findings: Prominent theories including implementation science, translational science and knowledge diffusion theories have previously been proposed to bridge the theory-practice gap. However, the radiography profession is a fast-paced, complex and a highly regulated profession which makes the application of rigid theories more challenging. CoPs, which have their origins in Social Learning Theory, represents a potentially more viable approach to bridging the theory-practice gap.

Conclusion: Cultivating and maintaining CoPs is a more practical approach to improve knowledge dissemination, EBP and CPD, allowing radiographers in practice to share knowledge, best practices, and experiences out with an organisational hierarchy. The collective pool of knowledge, and history created may contribute to further establishing the radiography profession and the radiographer identity as the CoPs connect, expand, and advance over time.

Implications for practice: CoPs may be cultivated and further investigated in radiography practice to improve knowledge dissemination, EBP and CPD, with the ultimate aim of improving individual and organisational performance in radiography practices.

Introduction

Establishing the effectiveness of a test, technique or intervention does not guarantee its uptake into routine clinical practice. It is estimated that it takes up to two decades for an evidence-based practice (EBP) to be integrated into clinical practice, with less than 50% of EBPs being eventually embedded.[1] However, there is an increasing need to actively engage with EBP to effectively respond to the current changes and demands in healthcare including workforce shortages due to staff recruitment and retention, improving the quality of services, accessibility, and increasing and more complex healthcare needs. The changes in healthcare have also significantly affected the radiography profession, leading to role developments due to a shortage of radiologists, increased waiting times and demand to streamline patient pathways.[2] Moreover, radiography is a fundamental discipline when considering the integration of rapidly advancing technology, diagnostics and therapeutic procedures, and quality-conscious users expecting effective, high-quality radiography services.[3] To actively respond to the changes within the profession, radiographers are increasingly expected to engage in EBP and continuing professional development (CPD).[4,5] However, the theory-practice gap in radiography remains existent with commonly reported barriers including negative attitude and beliefs, a lack of knowledge and skills, limited resources and a lack of support and authority.[6–9] To bridge the gap between theory and practice, implementation and knowledge

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diffusion theories have previously been proposed. This narrative review discusses key knowledge diffusion and implementation theories in the context of radiography, with particular emphasis on the social learning theory Communities of Practice (CoPs), a theory as yet unexplored in radiography practice.

Literature search

The authors identified three frequently cited knowledge diffusion and implementation theories: i) implementation science; ii) translational science; iii) and diffusion of knowledge theory. This review places a particular emphasis on CoPs, with the aim of introducing this theory into the radiography literature as a means of stimulating further research and discussion. Literature searches were performed in March 2024 with PubMed, ScienceDirect, Medline and Google Scholar. Keywords such as "knowledge diffusion", "implementation science", "knowledge translation", "communities of practice" in "healthcare" and "radiography" were used. As a few articles were found specifically related to radiography, key words such as "healthcare" and "radiology" were also included to broaden the search. Original research articles, reviews, reports, editorials and commentaries were reviewed to form discussion.

Implementation science

Implementation science is a relatively new field of study concerned with the application of research findings and other evidence-based knowledge into practice.[10] Implementation science was introduced as a direct response to poorly, or not implemented valuable EBPs and interventions. Moreover, even if successfully implemented, interventions or practices do not always produce the expected health benefits if the effectiveness is lost during implementation, or if the intervention or practice did not demonstrate improved outcomes in general.[11] Therefore, the crux of implementation science is two-fold: i) to identify barriers and facilitators to EBP across multiple levels including patients, providers, the organisation and other stakeholders, ii) and to develop and implement strategies that remove these barriers and enhance the facilitators to increase the uptake of EBPs and interventions.[10] Despite the rapid growth and interest in implementation science, designing implementation research remains a complex task, especially for health researchers who have not received specialist training in the field.[12,13] Additionally, another key challenge of implementation research is the continuously changing landscape affecting the implemented practice or intervention.[14] Therefore, health researchers must find ways to account for unmeasured effects of the implementation post hoc (i.e., changing policies over time). This suggests that applying this theory to a radiography setting is more challenging due to it being a highly regulated and fast-evolving industry. Additionally, the previously discussed challenges facing radiography (e.g., shortage of resources such as time and staff) may also affect successfully applying implementation research.

Translational science

Similar to implementation science, translational science aims to bridge the gap between research and practice. However, there is a greater emphasis on the "bench-to-bedside" process that retrieves knowledge from basic scientific research into clinical research for optimal delivery of care and treatment.[15] Translational science entered the literature in the 1990s, however, only became prominent after The National Institutes of Health implemented its Roadmap.[16] The Roadmap is a strategic plan intended to overcome challenges that hinder the ability to understand and promote human health through three strategies: i) developing new pathways to discovery, ii) creating research teams of the future, iii) and reengineering the clinical research enterprise.[17] The drive to develop The Roadmap stems from the gap between basic research findings and the instrumentation and resources utilised by healthcare practitioners to treat disease and alleviate human suffering.[16] The process of translational research aims to translate basic scientific research more quickly and efficiently into practice. According to the Translational Research Institute,[18] translational research encourages and promotes collaboration among laboratory and clinical researchers, incorporates preferences of the public through involving communities to determine their needs for health innovations, and identifies and promotes adoption of best health innovations. There are five phases of translational research indicated by T (for "Translational Phase"), including one phase reserved for non-human studies (T0).[18] To support and foster the process, translational scientists work collaboratively and innovatively to identify and eliminate barriers in the translation process and ultimately increase the efficiency and efficacy of translations.[19] Despite the efforts of translational science, translation of research findings into practice remains limited and a slow process.[15] Seyhan[15] suggests that the process of translational science is not a linear process with a beginning and an end but is rather complex and involves many feedback loops with the T0-T4 phases being interdependent and requiring continuous data gathering, analysis, dissemination, interaction, and consideration of overcoming hurdles in the translational process. Moreover, roadblocks such as the long process of the approval and development of a health innovation, and barriers relating to reproducibility and applicability of research findings into a clinical context are identified. Other potential barriers include a lack of funding, incentives and expertise and insufficient institutional and organisational support for translational research.[15,20,21] These findings align with translational research barriers relating to ionising radiation research in radiology.[22]

Knowledge diffusion

Whilst implementation and translational science are more recent theories, knowledge diffusion has a long history of theoretical and empirical attempts to understand the spread of ideas, practices, and actions within social systems.[23] In the 19th Century, two French social theorists proposed conflicting theories on how diffusion occurs. Tarde outlined three processes suggesting that individuals learn about an innovation through copying or "imitating" someone else's adoption of the innovation: i) repetition, in which there is an inventor and imitator; ii) opposition, in which there are various interpretations to the mimicry, particularly with diverse or changing circumstances; and iii) adaptation, in which a new balance is achieved by the imitators after interpretations are reconciled.[24,25] Le Bon argued that diffusion is a result of a herd instinct or "collective behaviour" with minimal room for interpretive nuance.[25,26] These early theories may explain current tensions between the demand for fidelity to EBP and professionals' need for adaptability. The professionals' resistance and adaptation may not be viewed as infidelity to EBP, but as a logical and natural adjustment of the innovation to suit diverse and evolving situationally specific contexts.[25]

Knowledge diffusion became particularly popularised by a communication theorists and sociologist Everett Rogers.[27] Rogers suggests that diffusion occurs through a five-step innovation-decision process: i) knowledge occurs when an individual or a unit is exposed to an innovation and gains an understanding of its functions; ii) persuasion occurs when an individual or unit creates a favourable or unfavourable attitude towards the innovation; iii) decision occurs when an individual or unit engages in activities that

leads to a choice to apply or reject the innovation; iv) implementation takes place when an individual or unit puts a new idea into use; v) confirmation occurs when an individual seeks reinforcement of an innovation-decision, however, may require to reverse this decision if exposed to conflicting messages regarding the innovation. Within an adoption curve, an innovation may reach a critical mass, in which there are sufficient number of adopters in a social system so that the rate of adoption becomes self-sustaining and drives further growth.[28] Rogers[28] outlines several strategies to reach the critical mass including targeting highly respected individual within the system's hierarchy, positively shaping individuals' perceptions and expectations regarding the innovation and introducing the innovation to a group within the system whose members are relatively more innovative (e.g., research and development units). Roger's systemic theory on innovation has been applied to many fields including healthcare.[29] Studies apply the theory slightly differently; this lack of cohesion may suggest that the theory is stagnant and difficult to apply with consistency.[30] Moreover, the theory may especially be challenging to apply to a healthcare setting due to complex (inter and extra) organisational, economic, political and ideological influences.[31] The theory has also been criticised for pro-innovation bias, and only considers latest innovations as progress, thereby ignoring alternatives.[32]

Communities of practice

CoPs was first introduced by anthropologist Lave and social learning theorist Wenger.[33] They proposed that learning "is a process of participation in communities of practice" – participation that is at first peripheral but may gradually increase in engagement and complexity. CoPs refer to groups of individuals who share a concern or passion for a topic, craft and/or profession, and expand their knowledge and/or expertise through regular interaction.[34] Therefore, CoPs act as a "living curriculum" that engages individuals in a process of "collective learning".[35] CoPs must have three distinct characteristics to be considered a CoP: i) the domain: involves individuals with an identity defined by a shared domain of interest, competence, and commitment (i.e., radiographers); ii) the community: creates the social structure that facilitates learning through interactions and relationships with others. Participants pursue their interests through joint activities, discussions, problem-solving opportunities, information sharing and relationship building; and (iii) the practice: the specific knowledge which the community aims to develop, share, and maintain (i.e., best practices in radiography) (Fig. 1).[36]

Wenger argues that learning is an intrinsically social process which occurs in CoPs. Wenger[34] proposes four premises regarding learning and the nature of knowledge, knowing and knowers: i) humans are social beings which is a central aspect of learning; ii) knowledge is a matter of competence relating to valued enterprises (e.g., discovering scientific facts, singing in tune etc.); iii) knowing is a matter of participating in activities relating to such enterprises, and actively engaging in such a world; iv) meaning relates to our ability to experience the world and experience engagement with it as 'meaningful' – this ultimately is learning, and therefore producing. Specifically active participation in social communities' practices, and construct identities in relation to these communities.[34] For example, participating in a work team is both, an action, and a form of belonging to the team. According to Wenger[34] such participations not only shape what we do, but also who we are and how we interpret what we do. He further expands on these arguments by proposing elements of social participation as a process of learning and knowing: i) leaning: our (changing) ability – individually and collectively – to experience and view life and the world as meaningful ii) practice: the shared historical and social resources, frameworks, and perspectives that allow sustaining mutual engagement in action; iii) community: the social configurations in which our enterprises are valued, and our participation is recognisable as competence; iv) identity: learning changes who we are and "creates personal histories of becoming in the context of our communities". Thus, cultivating a CoP may not only facilitate EBP and CPD in radiography, but also create history, and meaning and further establish the identity of "the radiographer", and the radiography profession. And vice versa, creating and establishing meaning, identity, and history in the radiography profession, may facilitate a collective strive to increase EBP and CPD in radiography.[37,38] CoPs promote a mindset that is not "forced" or requires advanced research skills and knowledge to engage in EBP, CPD and

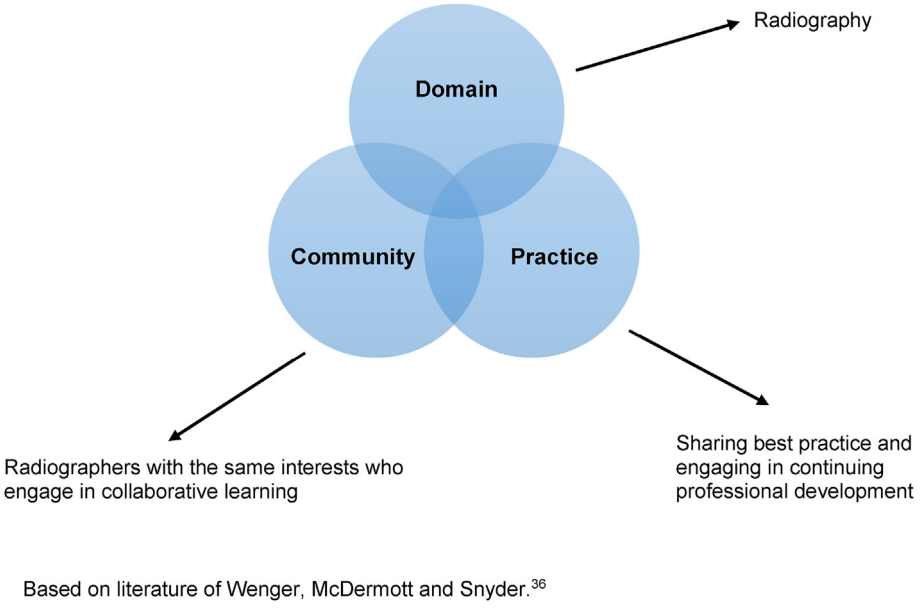

Figure 1. Characteristics of a community of practice applied to radiography.

knowledge dissemination, which may remove the negative attitude and lack of research skills barriers previously reported.[6,7,39] In this theory, individuals' talents, perspectives, and ambitions are recognised, involving members with different levels of participation (Fig. 2). The five levels of participation involve: i) the core team represents the participants that organise, market, nurture, and operate the community; ii) active participants operate directly with the core team to shape the definition and direction of the CoP, iii) occasional participants engage when topics of interest are addressed or when there is knowledge or a practice to contribute to the community; iv) peripheral participants have less engagement or authority to the community (e.g., new comers or individuals with less commitment to the practice). These individuals may be more active elsewhere and carry the learning to different communities; and v) transactional participants are least connected to the community and may only access the CoP for resources or to provide a specific service to the community (e.g., guest speakers).[40] Participants can move freely across the levels depending on their evolving interests and needs. The flexibility and movement across the levels may be considered beneficial as it allows natural flow of interaction and information-sharing which creates opportunity for learning and uptake of (new) knowledge.

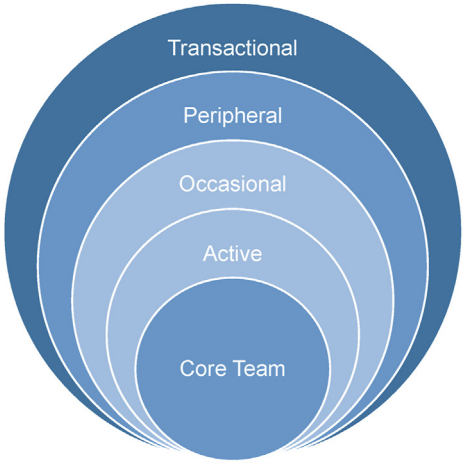

Figure 2. Levels of participation in a community of practice.

Cultivating communities of practice in radiography

To cultivate a CoP, Wenger, McDermott and Snyder[36] introduced the roles of leaders/champions and facilitators of a CoP. A leader/champion is often a leader who is well-respected within an organisation and is responsible for communicating the CoP to others, recruiting participants, and providing resources for group activities (e.g., radiography clinical lead). Facilitators organise and manage day-to-day activities, often assumed by a lead or manager who has great understanding of the mission and vision of the organisation, is resourceful and is well-connected to members and potential members of the CoP.[41] These roles, however, have been shown to vary or even merged across studies depending on the size of the CoP and availability of human resources.[41] In addition to these roles, Wenger, McDermott and Snyder[36] identify seven principles for cultivating successful CoPs (Table 1).

Communities of practice in radiography practice?

Since its introduction, the concept of CoPs has been applied to various disciplines and sectors including government, business, and education.[35,42] However, its application to healthcare practice has been limited and the structures may be inconsistent.[43,44] Some of these 'communities' resemble informal networks in which the aim and structure of the community is loosely defined, and others are similar to support groups with the aim to improve self-efficacy.[41,44] Additionally, the available literature reports barriers to engagement due to, for example, time constraints and lack of resources including appropriate spaces to meet, and access to workstations and operating systems for online CoPs. Furthermore, involvement of key members of the team, funding and organisational and managerial support are commonly reported requirements to successful CoPs.[44] In the context of radiography, these may be potential restrictions to cultivating and maintaining CoPs as frequently recorded deterrents to EBP and research implementations are a lack of time, resources and support from management and colleagues.[45] This indicates that radiographers may be forced to use personal time to participate and contribute to the community, which may be unfavourably received. In turn, it is arguable that this may negatively impact radiographers' interest, attitude, and motivation to participate in CoPs. Therefore, support from the organisation, management and colleagues is highly suggested to promote a culture and mindset for interdisciplinary collaboration and innovation within CoPs. Such a culture and

Table 1
Principles for Cultivating Successful Communities of Practice. Based on literature of Wenger, McDermott and Snyder.[36]

Seven Principles for Cultivating Successful Communities of Practice	
1. Design for evolution	The nature of a community is dynamic due to participants' and the community's changing interests, ambitions, and focus. Therefore, design the community to evolve naturally to respond to these changes.
2. Create a dialogue between in- and outside perspectives	The participants' knowledge within the community is a valuable resource. Nevertheless, it is also beneficial to consider perspectives from outside the community to appreciate different possibilities for achieving the learning goals.
3. Invite and allow different levels of participation	Levels of participation and movement between the levels is natural as participants have (changing) levels of interest in the community.
4. Develop public and private community spaces	Communities typically operate in public spaces (face-to-face or electronically). Nevertheless, participants could coordinate an individualised approach to discuss specific needs (e.g., phone call, e-mail exchange or problem-solving conversation).
5. Focus on value	Communities deliver value to the organisation, teams, and individual participants. Participants should be encouraged to be explicit regarding the value of the community throughout its lifetime.
6. Combine familiarity and excitement	Communities of practice are "neutral places" that provide both familiarity, and interesting and varied events to cycle new ideas and individuals in the community.
7. Create and maintain a rhythm for the community	Communities of practice require a thriving cycle of activities that enables participants to regularly meet, reflect and evolve. The rhythm should be maintained at an anticipated level of engagement to sustain vibrancy of the community, yet not be highly fast paced to become overwhelming.

mindset may also be cultivated among students in their radiography education, ready for when entering practice.

The available literature in healthcare has also shown positive outcomes of CoPs. This includes improved expertise, efficiency, knowledge dissemination, performance, problem-solving and decision-making in everyday workplace, and benefits in acclimating new members or novices to their new roles.[44,46] Considering the previously discussed barriers such as a lack of time, research skills, and the negative attitudes, CoPs may be argued a more viable approach to improving EBP, CPD and knowledge dissemination in radiography as it is more practical and allows flexible participation.[45] Additionally, radiology departments are often fast-paced, complex and highly regulated, which may benefit from the flexibility CoPs offers to rapidly respond to patient needs and inquiries, to spawn new ideas for products and services and to reduce rework and prevent "reinvention of the wheel" through "simply" socialising and communicating. Such communities can be organised face-to-face and/or online, and expand over time creating Networks of Practice, in which individual radiography communities link and share knowledge despite a lack of relational ties and high geographic dispersion.[47] Therefore, it may be beneficial to further investigate and discuss the application of CoPs in radiography practice. The theory could potentially promote knowledge dissemination, EBP and CPD and ultimately improve personal and organisational performance in radiography practices.

Conclusion

Despite previous efforts, the gap between theory and practice remains existent, causing delays and missed opportunities responding to the current healthcare demands in radiography. CoPs may be a viable approach to promoting EBP, CPD and knowledge dissemination in radiography, creating a network in which individuals share their knowledge, best practices and experiences, and collectively generate new knowledge as a pool of resources and data is formed. Wide-spread application of the theory may contribute to establishing the radiography profession and radiographer identity through the history and pool of knowledge created as the community expands and advances over time.

Conflict of interest statement

None.

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