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Social living labs for informed learning: A conceptual framework of interprofessional education in community healthcare

Hilary Hughes, Queensland University of Technology.
Email: h.hughes@qut.edu.au

Marcus Foth, Queensland University of Technology.
Email: m.foth@qut.edu.au

Kerry Mallan, Queensland University of Technology.
Email: kerry.mallan@gmail.com

Abstract

This paper proposes social living labs for informed learning as an innovative approach to interprofessional and community education. It presents a new conceptual model and practice framework suited to rapidly changing, information-intensive work and social environments. The proposed approach is theoretically informed and evidence based. It integrates concepts from three complementary fields: Informed learning as information literacy pedagogy that enables using information critically and creatively to learn (information science); interprofessional education as a professional learning model with a cross-disciplinary and community reach (health sciences/medicine); and social living labs as informal learning context and problem-solving process (community development).

After reviewing relevant literature, the paper introduces the concepts and research that underpin social living labs for informed learning. Then it presents a new conceptual model and a practice framework to guide their design and implementation. To illustrate the practical application of this approach, a hypothetical scenario envisages health practitioners, librarians and community members collaborating in a social living lab to address health and social challenges related to child obesity. The paper concludes by discussing anticipated benefits and limitations of the approach and possible wider application.

As a contribution to theory, the paper uncovers a previously unrecognised synergy between the principles of informed learning, social living labs and interprofessional education. Supporting information literacy research and practice, the paper identifies a significant role for informed learning in community and professional education, and a novel strategy for health information literacy development. The paper is of interest to educators, researchers, and practitioners across information literacy, community development, healthcare, and other professional fields.

Keywords

Australia; community development; community healthcare; health information literacy; information literacy; informed learning; interprofessional education; social living labs

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1. Introduction

Rapidly changing work and social environments call for continuous learning across the professions and the community, especially with regard to healthcare and health information literacy. As discussed in this paper, contemporary healthcare requires critical and creative information use, and the constructive sharing of knowledge, professional expertise and life experience among all stakeholders. For healthcare practitioners, the trend towards interprofessional collaboration and community engagement requires participation in continuous learning beyond formal education. In addition to maintaining currency in their specialist fields, this involves developing skills to better understand their patients' lived experience. Meanwhile, community members need problem solving capabilities and information and digital literacies to understand and manage their personal health needs.

This paper proposes social living labs for informed learning as an innovative educational approach that includes professionals and community members. It offers a new conceptual model and practice framework that integrate key principles from several complementary fields: (a) informed learning as information literacy pedagogy (information science/education); (b) social living labs as a context for informal learning and process for collaborative problem solving (community development); and (c) interprofessional education as a professional learning model with a cross-disciplinary and community reach (health sciences/medicine). Informed learning enables 'using information to learn' critically, creatively and responsibly. It enables problem solving, digital participation and evidence-based practice in educational, workplace and community settings (Bruce & Hughes, 2010). Interprofessional education involves collaborative learning across multiple professions with a view to improving the practice and quality of healthcare (Barr et al., 2017, p.4). Social living labs bring together people with diverse backgrounds to address shared concerns. A social living lab's context may encompass one or several physical and virtual locations. For example, participants may connect at different times in a local library, park and a Facebook group. The social living labs process generally involves four activities: co-creation, exploration, experimentation and evaluation (Garcia Robles, Hirvikoski, Schuurman & Stokes, 2016; Schumacher, 2015).

Drawing upon the authors' interdisciplinary research, this paper further explores the nature of social living labs and their inter-relationship with informed learning and interprofessional education. By revealing a previously unrecognised synergy between the principles of informed learning, interprofessional education and social living labs, the paper offers new avenues for cross-disciplinary theory building. In addition, the proposed approach contributes to information literacy research and practice by identifying a significant role for informed learning in community and interprofessional professional education. The healthcare connection through interprofessional education is of particular relevance to health information literacy development.

After this introduction, the paper reviews key literature to highlight the social implications of changing work and community environments, especially for healthcare and associated need for collaborative learning opportunities for all stakeholders. It then details the development of new conceptual model of social living labs for informed learning and practice framework to support their design and implementation. A hypothetical healthcare scenario illustrates a possible application where community members, health practitioners and librarians collaborate in a social living lab that addresses challenges of child obesity. Finally, the paper discusses the benefits and limitations of this approach and its possible extension to other social problems and fields beyond healthcare.

2. Changing work and social environments

Professionals and their communities face complex learning needs associated with rapidly changing socio-economic conditions. Globally, pervasive digital technologies are disrupting

employment and social wellbeing (Australian Government. Productivity Commission, 2016). The global information technology report (Baller, Dutta & Lanvin, 2016, p.3) suggests that we are 'at the dawn of the Fourth Industrial Revolution' with a new set of systems that combine digital, biological and physical technologies. Employment conditions are also changing, with automation leading to the disappearance of routine-based work, especially low and mid-skilled tasks (Australian Government. Productivity Commission, 2016; Organisation for Economic Cooperation and Development (OECD), 2016).

To thrive in technology-driven work and social environments individuals of all backgrounds need well developed information literacy and digital skills to manage information overload (Hemp, 2009) and to collaboratively solve problems in online environments (Mason, Fleming, Paxton & Singh, 2017). This generally requires context-specific critical thinking and understanding that surpass generic information searching skills.

Evolving work conditions and digital disruption have significant implications for education and training. As the emphasis on pre-employment education gives way to lifelong learning and connected learning (Lankester, Hughes & Foth, 2017; Nussbaum-Beach & Hall, 2012), people need to move flexibly in and out of study and other forms of training. This calls for new open educational opportunities for people in and between jobs that enable continuous and just-in-time learning that is experiential and develops interaction through technology (OECD, 2016).

2.1 Healthcare

Healthcare exemplifies the complexity of changing work and social environments, and associated information and learning needs. Health issues are increasingly complex and affected by a range of social, environmental and economic factors (Nandan & Scott, 2014). Healthcare practitioners and their clients are challenged by rapid advances in medical knowledge and digital technologies (World Health Organisation, 2010). Individuals are expected to take responsibility for their own health management, while primary healthcare practitioners face increasing caseloads, an aging population, more chronic and complex illness, and demand for community-based primary care (Primary Care Workforce Commission, 2015). For example, the role of the general practitioner (GP) is expanding from treating acute medical cases to whole-of-person care that encompasses social wellbeing, health education and illness prevention (Royal College of General Practitioners, 2014).

Well-developed health information literacy is essential for practitioners who are operating in a complex information environment of emerging medical technologies, digital health records and virtual consultations (Royal College of General Practitioners, 2014; Schardt, 2011; Smith et al., 2013). They may gain information via a multitude of sources including systematic reviews, professional journals, government and popular web sites and social media. Although web search engines provide access to a vast array of health information, they are unreliable indicators of quality as results are often filtered by popularity and previous searching behaviour (Klerings, Weinhandl & Thaler, 2015). Furthermore, patients also access these resources to diagnose themselves and frequently challenge health practitioners (Lupton, 2013). Therefore, practitioners need the capacity to critically navigate myriad sources and to discriminate between information of widely varying quality, from evidence-based recommendations to personal health tips. However, time pressures and limited digital skills often prevent the integration of effective information processing into their workflow (Klerings et al., 2015). Consequently, there is a tendency among healthcare professionals to use quickly accessible but lower quality information (Klerings et al., 2015).

Increasingly, GPs and other health professionals are expected to think globally and act locally, applying cultural competence and social responsibility to meet the changing needs of communities (McKimm & McLean, 2011). This involves engaging with patients in shared decision-making and personalised health strategies, while responding inclusively to individuals

with varying levels of cognitive and physical ability, literacy and language. Therefore, in addition to constantly updating their own knowledge, practitioners need to filter health information in meaningful ways for their patients to enable their shared decision-making (Klerings et al., 2015). This involves:

> supporting patients to develop health literacy skills, both in understanding and using health information, and in understanding their rights to clear, accessible information tailored not only to their clinical needs but also to their health literacy. (Royal College of General Practitioners, 2014, p.23)

The trend towards collaborative healthcare services requires practitioners from differing specialist fields to work as equal partners. To succeed in this interactive context, practitioners need to develop a range of capabilities, in addition to medical knowledge. These capabilities include: information and digital literacies; interpersonal communication, collaboration and teamwork; cultural fluency; critical reflection; patient education and health promotion; and awareness of their patients' socio-cultural context (Canadian Interprofessional Health Collaborative, 2010; Schardt, 2011; World Health Organisation, 2010; Xyrichis & Lowton, 2008). Given increasing budgetary and workforce pressures, and rising community expectations, there are calls from within the medical profession for systemic change in general practice and development of more sustainable ways of working (Royal College of General Practitioners, 2014). In response, there is a growing trend towards interprofessional practice that builds upon the concept of holistic patient-centred care. This approach aims to address complex health issues in an integrated and comprehensive manner that enables patient and community participation (Nandan & Scott, 2014). Thus, it involves cross-sector collaboration between physicians, midwives, psychologists, social workers, nutritionists, physiotherapists, other healthcare workers (World Health Organisation, 2010), and sometimes trained volunteers (Kastner et al., 2017).

These challenges call for innovative approaches to pre-service and continuing interprofessional education for healthcare practitioners (Nandan & Scott, 2014; Royal College of General Practitioners, 2014; World Health Organisation, 2010). Moreover, there is an evident need for initiatives that bring together professional and community stakeholders for collective problem-solving around health and other social problems.

3. Method

In response to the above challenges, and drawing upon our interdisciplinary research, the authors developed the concept of social living labs for informed learning. Initially, through critical reading of key literature we compared the principles of informed learning and activities of social living labs and identified what we collectively deemed to be similar concepts. For example, we determined that Exploration (social living labs) and Experimentation (informed learning) share common theoretical ground. We then developed a conceptual model to show how we understood that they mesh together (see Figure 1 [4.4]).

Similarly, we compared the characteristics of informed learning and principles of interprofessional education and identified points of alignment between their respective aims and practices (see Table 1 [4.4]). For example, we found that that these two different approaches have shared goals to bring about transformative learning and social wellbeing. Based on this analysis, and our experience as educators, we created a practice framework (see Table 2 [5]) to support the design and implementation of social living labs for informed learning in professional and community contexts. To exemplify how this approach might work in practice, we devised the hypothetical community healthcare scenario presented in this paper.

While the conceptual model and practice framework are grounded by previous research into social living labs, we acknowledge as limitations of this theoretically-based work that the alignment of principles (Figure 1, Table 1) and the practical application of the framework (Table 2) are yet to be empirically evaluated.

4. Key concepts: Informed learning, interprofessional education and social living labs

Social living labs for informed learning integrate two key concepts – informed learning and social living labs. For healthcare this approach is also informed by interprofessional education. These three concepts and the synergy between them are now discussed.

4.1 Informed learning

Informed learning offers a holistic approach to information and digital literacy development that is attuned to contemporary work and community needs:

> In today's information-rich society, high quality interaction with the information environment is the cornerstone of all learning. By being creative and reflective information users, we are able to learn and to continue learning in any field or walk of life. (Bruce, 2008, p.3)

Conceptually, informed learning builds upon an understanding of information literacy as 'experiencing different ways of using information to learn' (Bruce, 2008, p.5). Information is understood to be 'anything that we experience as informing' in a particular context or discipline (Bruce, 2008, p.5). Thus, in a healthcare context information can include medical facts, research findings, systematic reviews, statistical models, x-rays, intuition, professional insights, and sensory stimuli through patient observations. Learning involves extending awareness (or understanding) through experiencing aspects of the world in different ways (Marton & Booth, 1997).

As a pedagogical construct, informed learning promotes a continuous process of using information to learn (Bruce, 2008). This process is underpinned by three principles and defined by twelve characteristics (Bruce & Hughes, 2010). In combination, the principles and characteristics guide the design of informed learning activities.

The principles (Figure 1) determine that informed learning:

1. Builds upon learners' existing experiences of information use and learning.

For example, in monitoring a patient's progress, a nurse draws on their existing knowledge and experience and where necessary expands their professional information base through a variety of sources such as textbooks, case notes, ECG readings and physical observations.

2. Promotes simultaneous learning about information use and a particular topic.

For example, a student dietician discovers and learns to use a digital app in the process of learning about the relationships between glucose, insulin and diet in diabetes.

3. Brings about changes in learners' experience of information use and learning.

For example, through reading various blogs a physiotherapist experiences new understanding about how and why patients react differently to pain – and is inspired to extend others' understanding by sharing her insights online with colleagues worldwide.

The inter-related characteristics (Table 1), indicate that informed learning is: expansive; grounded; contextualised; active; reflective; creative; eclectic; inclusive; balanced; socially responsible; collaborative; and transformative.

In practice, informed learning enables critical and responsible use of information in workplace, community and educational settings (Bruce, Hughes & Somerville, 2012; Bruce, Somerville, Stoodley & Partridge, 2013). Informed learning encourages learners to explore different information using experiences. Its scope extends beyond developing information skills, to using information critically and creatively in socially constructive ways. As an experiential and reflective learning approach, it supports purposeful information use and learning about topics relevant to learners' interests

With regard to healthcare, informed learning enables practitioners to more effectively manage the information overload they face (Klerings et al., 2015). It can also bring deeper understanding about the different ways people use health information and how it affects their decision making and actions (Yates et al., 2012). It supports the need for shared practitioner–patient learning that varies 'across cultural and contextual boundaries, across time, and across a lifetime' ensuring that 'health messages are designed and delivered in different and constantly changing ways in order to meet the diverse needs of a multifaceted community' (Yates et al., 2012, p.472).

4.2 Interprofessional education

Interprofessional education (IPE), which originated in the healthcare disciplines, aims to enable 'two or more professions to learn with, from and about each other to improve collaborative practice and quality of care' (Barr et al., 2017, p.4). IPE draws on experiential, social-constructivist and situated learning theories to support reflective and evidence-based practice in real world contexts. Its 24 guiding principles (Table 1) represent 'a repertoire of learning methods within a rationale comprising values, objectives and theory grounded in evidence' (Barr et al., 2017, p.3).

Alongside formal healthcare education, informal and serendipitous interprofessional learning is essential to ensure improvement of professional practice and care 'to support and enhance the lives of individuals, communities and populations' (Freeth, Savin-Baden & Thistlethwaite, 2018, p.191). While interprofessional education is becoming established in initial degree and certification programs, there is a need to extend its scope post-qualification to assist practitioners with transitioning into the workforce and progressively extend their professional responsibilities (Barr et al., 2017):

> Ideally, pre-qualifying IPE [interprofessional education] is the first step from induction and orientation into advanced or specialist practice, and educational, managerial or research roles along a continuum of interprofessional development (CIPD) woven into the continuum of professional development (CPD). (Barr et al., 2017, p.17)

Challenges for continuing interprofessional learning include how to provide new entrants to their profession with appropriate encouragement and guidance from supervisors and mentors, and access to further study and professional development (Barr et al., 2017). Interprofessional educators also need opportunities to develop understanding and pedagogical practices to facilitate the learning of students with diverse backgrounds, expectations and learning styles. In addition, it is important yet often difficult to ensure that service users and carers 'invariably be at the centre of IPE' (Barr et al., 2017, p.13).

4.3 Social living labs

Social living labs are a recent variation on the original living labs model which was developed in the mid-2000s in Europe and the US to address needs of the emerging innovation economy (Ballon & Schuurman, 2015; Franz, 2015).

Living labs bring together a range of professional and community stakeholders in:

> User-centred, open innovation eco-systems based on a systematic user co-creation approach integrating research and innovation processes in real life settings. (Garcia Robles et al., 2016, p.13)

As originally conceived, living labs involve groups of end-users in generating innovative products, services or policies. They offer opportunities for people to become 'immersed in a creative social space for designing and experiencing their own future' (Schumacher, 2015, p.4). Living labs also constitute sites of experiential learning (Schumacher, 2015).

Living labs usually involve a diverse group of participants in the following four-phase activity cycle (Garcia Robles et al., 2016; Schumacher, 2015):

- Co-creation: sharing views, constraints and knowledge as a basis for exploring new ideas about products and services;
- Exploration: engaging stakeholders in live scenarios that play out the ideas for new products and services;
- Experimentation: testing the products and services in real situations experience live scenarios with many users and collecting data for evaluation;
- Evaluation: assessing new concepts and products using the data collected during the evaluation phase through various socio-ergonomic, socio-cognitive and socio-economic lenses; and identifying their potential for widespread adoption.

Social living labs generally follow the above pattern. However, they intentionally extend beyond commercial, product-centred purposes to 'spaces of encounter' that address socially oriented problems in a real-life environment (Franz, 2015, p.63). Social living labs aim to involve researchers, professionals and local residents alike in the co-construction of knowledge and practical solutions through 'living methods' that are interactive and engaging (Franz, 2015, p.63).

To date limited research has examined the theory, practice and outcomes of living labs, especially those with a social orientation (Ballon & Schuurman, 2015; Franz, 2015). Addressing this research gap, the authors undertook a research project between 2014 and 2017 that explored the potential of social living labs to foster digital participation in Australian regional and rural communities (Dezuanni, Foth, Mallan, Hughes & Osborne, 2017). The research team worked with about 20 different community groups and approximately 150 local residents through various living labs that supported collective learning and problem solving around particular community concerns. Some participants contributed to formal case studies, including those featured below.

Our research shows how a social living lab provides both an informal learning context and a process for community-based problem solving (Dezuanni et al., 2017). As an umbrella for a variety of problem-solving and learning activities, a social living lab can draw together people with diverse experience and backgrounds. Rather than conforming to a set format, social living labs are open-ended and organic. In contrast to a formal course, there are generally no entry requirements to join a social living lab. They are driven by the participants, rather than by external trainers and generic training agenda. While participants draw on particular expertise as

needed, such as web design, social living labs generally thrive on peer sharing of knowledge and capabilities. For example, the Food Rescue social living lab enabled a voluntary organisation to achieve digital solutions to operational problems in distributing unsold food to needy residents in the regional Queensland city of Townsville (Hughes, Wolf & Foth, 2017). Initially, volunteers worked with an IT professional to select, install and use open source software. Social learning benefits continued as the original participants mentored new members.

Every social living lab has an identifiable focus. It can comprise any number of initiatives of varying types that contribute to an evolving learning ecology. Thus, purposeful learning events such as workshops might contribute to the broader living lab, but a single workshop does not generally constitute a whole living lab. For example, the authors studied a social living lab that supported the design and implementation of a community makerspace called Mixhaus in Townsville (Foth, Lankester & Hughes, 2017). The social living lab involved various initiatives including an electronics workshop run by a community volunteer. This workshop enabled participants to learn how to use necessary equipment so that they could set up the makerspace and undertake a range of ongoing projects.

The focus and activities of a social living lab may evolve over time as participants come and go or their interests shift. For example, individual learning goals from an environmentally-focused social living lab may be as simple as making memes for advocacy purposes or as complex as designing, implementing and evaluating a bushland conservation campaign (Hughes, Foth, Dezuanni, Mallan & Allan, 2018). Participants tend to learn new capabilities coincidentally through the activities they engage in, such as migrants learning new recipes whilst practising colloquial English (Kettle, 2017).

4.4 Synergy: Informed learning, social living labs and interprofessional education

The proposed social living labs for informed learning approach builds upon an apparent synergy, revealed by our analysis, between informed learning, social living labs and interprofessional education. As shown above, they are all contemporary learning approaches that promote collaborative and creative problem-solving.

Figure 1 represents a new conceptual model which shows how the three principles of informed learning (Bruce & Hughes, 2010) align with phases of social living labs (Garcia Robles et al., 2016; Schumacher, 2015). The three interconnected circles represent the social living labs activities of exploration, experimentation, evaluation and co-creation. Exploration and experimentation are combined here as our examination of relevant literature indicated that they involve similar practices. Informed learning principles (normal font) are shown in the intersections of the three circles. For example, the informed learning principle builds on existing experiences of information use and learning is shown to be closely related to social living labs activities of exploration–experimentation and co-creation. Informed learning characteristics (italic font) shown in the ovals describe the nature of the respective living labs activities. The location of the concept using information to learn at the heart of the diagram suggests a productive inter-relationship between social living labs (as informal learning context and collaborative problem-solving process) and informed learning (as information literacy pedagogy). Thus, we contend that a social living lab offers participants an inclusive and creative environment where they can use information to learn (Bruce, 2008) while addressing community concerns.

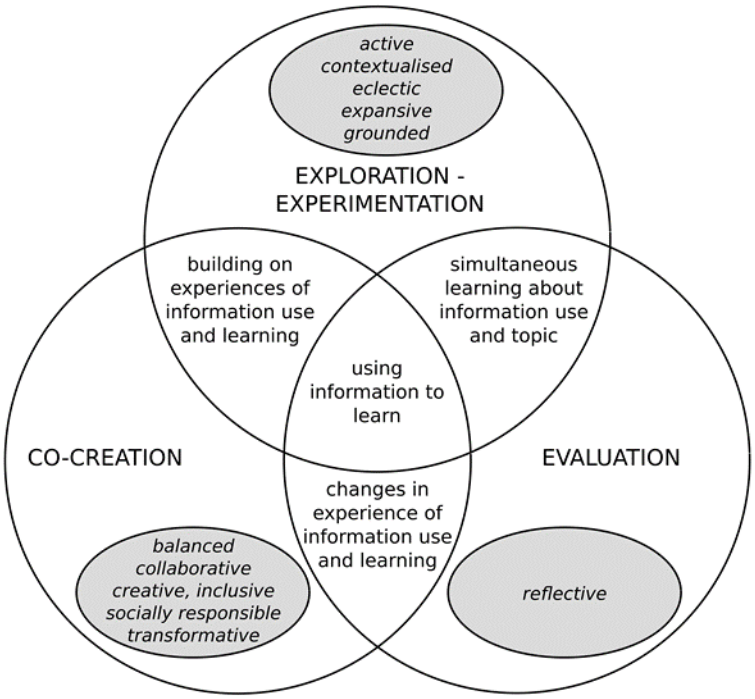

Figure 1: Model of social living labs for informed learning

Table 1 details points of alignment between characteristics of informed learning in the left column (Bruce & Hughes, 2010) and interprofessional education principles in the right column (Barr et al., 2017). The letters V, P and O indicate particular principles where:

- V (for Values) represents the social and pedagogical goals that underpin interprofessional education;
- P (for Process) denotes key characteristics of the learning and teaching approach; and
- O (for Outcomes) outlines the knowledge and skills that students are expected to achieve though interprofessional education.

The table shows only representative examples, while our comparative analysis found further commonalities between the characteristics and principles. For example, Table 1 shows alignment between the interprofessional education principle *enables professions to learn with from and about each other to optimise exchange of experience and expertise* and the informed learning characteristic *collaborative*. In reality this same interprofessional education principle also shares common ground with informed learning's *expansive, contextualised, grounded, active and eclectic* characteristics.

Based on our comparative analysis of informed learning characteristic and interprofessional education principles, it appears that these two different approaches share similar aims to bring about transformative learning and social wellbeing. Both promote the development of information and digital literacies which were previously identified as being necessary for learning and working in contemporary technology-intensive environments. Both also contribute to health information literacy, through their respective disciplinary grounding: informed learning in information literacy, and interprofessional education in healthcare/medicine. They similarly have an interdisciplinary reach and support holistic, contextualised co-construction of knowledge and evidence-based practice. Meanwhile, each has a dimension that would enhance the other, namely: informed learning's focus on critical, creative and responsible information use; and interprofessional education's promotion of values in learning and professional practice.

Table 1: Alignment of informed learning and interprofessional education

Informed learning characteristics (Bruce & Hughes, 2010)	**Interprofessional education principles** (Barr et al., 2017) V = Values P = Process O = Outcomes
Active: learning through inquiry, problem solving, evidence-based practice, research	- Encourages student participation in planning, progressing and evaluating their learning (P)
Balanced: using information critically, ethically, reflectively, creatively to learn	- Subjects developments to systematic evaluation and research (O)
Collaborative: bringing together educators, researchers, practitioners of diverse disciplines and professional backgrounds	- Enables professions to learn with from and about each other to optimise exchange of experience and expertise (P)
Contextualised: relating to disciplines and contexts (formal and informal)	- Integrates learning in college and the work place (P) - Includes discrete and dedicated interprofessional sequences and placements (P)
Creative: applying information to generate innovative ideas, practices and products	- Disseminates its experience (O)
Eclectic: using a range of information of differing types, sources and media	- Synthesises theory and practice (P)
Expansive: expands knowledge and information using capacity	- Comprises continuum of learning for education, health, managerial, medical care, health outcomes and wellbeing (P) - Carries credit towards professional qualifications (P) - Applies consistent assessment criteria and processes for all the participant professions (P) - Engenders interprofessional capability (O)
Grounded: addressing real-life problems in work, community or educational settings	- Grounds teaching and learning in evidence (P)
Inclusive: fostering social and cultural awareness, community engagement, shared learning and culturally appropriate professional responses across diverse populations	- Applies equal opportunities within and between the professions and all with whom they learn and work (V) - Respects individuality, difference and diversity and all with whom they learn and work (V) - Promotes parity between professions in the learning environment (V) - Sustains the identity and expertise of each profession(V) - Deals in difference as it searches for common ground(P)
Reflective: making sense of information use and learning through reflection	- Reviewing policy and practice critically from different perspectives (P)
Socially responsible: promoting ethical and wise information use, that respects information rights, safety and privacy, and enables informed decision-making	- Focuses on needs of individuals, families and communities to improve quality of care, health outcomes and wellbeing (V) - Instils interprofessional values and perspectives through uniprofessional & multiprofessional learning (V)
Transformative: influencing change in learners' understanding of discipline and professional practice, enhancing wellbeing	- Informs joint action to improve services and instigates change (O) - Enhances practice within each profession (O) - Improves outcomes for individuals, families and communities (O)

There is a degree of commonality in understanding IL as a process of using IT tools and as information skills but in the latter case there are distinctly different understandings of the nature of information skills involved. The next section discusses these findings and their implications for practice within and beyond the LIS profession.

5. Practice framework: Social living labs for informed learning

Moving from theory to practice, and building upon the synergy discussed above, Table 2 presents a framework to guide the design and implementation of social living labs for informed learning. For this framework, informed learning contributes a pedagogical dimension that emphasises critical, creative and responsible information use across professional and community settings. Social living labs provide a context for informal learning and a process for collaborative problem-solving which are inclusive and conducive to open-ended social action. Interprofessional education principles and values are understood to be incorporated into respective informed learning characteristics, as shown in Table 1 above.

The framework (Table 2) outlines a holistic social living lab experience. It is structured around informed learning characteristics (Bruce & Hughes, 2010) and the three social living lab phases (Figure 1). The three phases – Exploration–Experimentation, Co-creation and Evaluation – are shown by the highlighted rows. Activities which might occur within each phase are grouped in the middle column. The aim for each group of activities is described by an informed learning characteristic in the left column, while the right column indicates possible associated outcomes. For example, the first line of the framework indicates that an aim of the Exploration–Experimentation phase of a social living lab is to promote active informed learning among groups and/or individuals. Suggested activities include undertaking a fun community challenge that responds to a social problem and provides authentic evidence to inform professional practice.

Table 2: Practice framework: Social living labs for informed learning

AIMS	ACTIVITIES	OUTCOMES
Social living lab: Exploration-Experimentation		
Active	Group/individual problem-solving activities: *e.g. a community fun challenge to address a social problem.*	Raised community awareness of problem and effective responses. Evidence gained to guide practice.
Contextualised	Identifying participants' interests and needs: *e.g. focus groups, blog*. Integrated work-community learning.	Awareness of community demographics and needs. Sustained interaction.
Eclectic	Exploring and using a wide range of information: *e.g. physical objects, print and digital, sensory stimuli, people*.	Familiarity with range of information & media to investigate & communicate ideas, concerns. Theory into practice.
Expansive	Variety of learning activities suited to different participants: *e.g. projects, research, online quizzes, artwork*.	Knowledge. Problem solving capacity. Professional capabilities. Community engagement.
Grounded	Seeking & using real evidence to solve problems: *e.g. facts, photos, stories.*	Evidence on the problem collected, analysed and presented to community
Social living lab: Co-creation		
Balanced	Developing information and digital literacies: *e.g. use varied resources and technologies to explore problems*.	Logical, evidence based, trustworthy, accountable solutions proposed/ adopted.
Collaborative	Identifying common problems: *e.g. survey, brainstorming*. Developing, presenting & advocating shared solutions: *e.g. display, blog.*	Expertise shared among all stakeholders. Mutually valued solutions devised/ implemented.
Creative	Sharing views & solutions: *e.g. videos, posters, festivals.*	Ideas and solutions shared with community and professions.
Inclusive	Attending to different viewpoints and consensus-based decision making: *e.g. moderated forums, polls.*	Diverse community and professional perspectives equitably identified and shared.
Socially responsible	Applying information rights, digital safety, responsibilities and privacy: *e.g. evaluating news, creating positive digital footprint and professional identity*.	Informed digital citizenship Information of all types ethically used and acknowledged, including visual and Web based texts.
Transformative	Experimenting with different ideas, new technologies, alternative solutions. Using information to learn in new ways.	New knowledge, skills. Innovative solutions. Improved outcomes for individuals & communities.
Social living lab: Evaluation		
Reflective	Reflecting on problem, process and outcomes from different perspectives. Critically reviewing policy and practice.	Enhanced and diverse understanding about problem and authentic outcomes.

This framework is intended to be suggestive rather than prescriptive, and adaptable for differing community and professional contexts. As social living labs are essentially organic, this framework offers a menu of possible options that could be integrated into a social living lab rather than a comprehensive checklist of essential items. The social living lab phases are intended to be iterative and flexible. with no expectation to follow the framework in a sequenced way or to cover all points. The following community healthcare scenario offers an example of how the framework might be implemented in practice.

6. Scenario: Healthy eating for active children

This hypothetical scenario illustrates the implementation of a social living lab for informed learning titled *Healthy eating for active children.* The focus on childhood obesity exemplifies a major public health problem requiring interdisciplinary practice and community participation. The envisaged living lab represents an educational response that enables problem solving and informal learning through the collaboration of practitioners and community members. The envisaged context, problem and process of the three-phase social living lab are outlined below and clarified with explanatory commentary. To exemplify the application of the practice framework (Table 2) to this social living lab, Appendix 1 fills in some details related to the activities outlined above. Given the organic nature of social living labs, the aims, activities and outcomes might unfold quite differently in reality depending on the needs and intentions of the participants.

6.1 Context and problem

Hypothetically, a new community health clinic offering a wide range of health services has absorbed a long-established general medical practice. With the stated mission to promote community health and wellbeing, clinic services now include physiotherapy, counselling, nutrition, nursing care, pathology and radiography. Although the clinic offers convenience for patients, individual practitioners are experiencing a variety of challenges in keeping up-to-date with medical developments and adapting their professional practice to meet changing community expectations. Many are unsure about how the concept of 'community healthcare' applies to their specialist area. In particular, the physicians who are used to working independently and privately with patients are struggling to find their professional place within a new interprofessional team. Meanwhile many patients who are used to consulting one GP are challenged by the prospect of becoming clients of a team of health professionals and expectations to manage their own health. The online booking system with many customisable features is also a barrier for some. Consequently, the clinic educator proposes a social living lab to collaboratively enhance capabilities for interprofessional practice and community engagement. As a focus, the practitioners collectively identify child obesity as a compelling problem confronting them and their community.

Commentary: Childhood obesity is an increasingly prevalent public health crisis in countries worldwide (Karnik & Kanekar, 2012; World Health Organisation, 2016). As obesity is associated with an array of biological, behavioural, emotional and social factors, it requires specialist interdisciplinary attention (Godley & Russell-Mayhew, 2010; Karnik & Kanekar, 2012; Sahoo et al., 2015) as well as collaborative interventions involving individuals and families, care deliverers and community systems (Dietz et al., 2017). In presenting an integrated framework to prevent and manage obesity, Dietz et al. point out that its successful implementation requires health professionals to 'assimilate emerging science and skills related to obesity, adopt a population-based care delivery approach, and learn to work together as an interprofessional team' (2017, p.6). However, Dietz et al. have found that many health practitioners are insufficiently prepared to manage this problem beyond clinical settings where they focus independently on individual patients. In contrast, working in an interprofessional team is unfamiliar to many and necessitates:

> A training and education paradigm shift from an individual, clinically focused model limited to a health care setting to a patient- and family-centered model that is community focused and that addresses the social, behavioral, and environmental determinants of health.
> (Dietz et al., 2017, p.7).

This scenario illustrates the potential of a social living lab to address the diverse health information and interprofessional learning needs of health practitioners associated with rapidly

changing socio-economic and professional practice (Klerings et al., 2015; McKimm & McLean, 2011; Nandan & Scott, 2014). It shows an opportunity to create an inclusive learning context and build genuine connections between healthcare professionals and community members. By embracing their varied knowledge and lived experience, the social living lab becomes a 'space of encounter' (Franz, 2015; Kettle, 2017) for those with mutual concerns about of child obesity. As a site for informed learning (Bruce & Hughes, 2010) this social living lab enables participants to simultaneously extend their information-digital literacies as they co-construct knowledge and strategies to address child obesity challenges.

6.2 Exploration–Experimentation phase

The social living lab commences in the Exploration–Experimentation phase with a researcher profiling the local community. In gathering demographic and published descriptive data, the researcher is supported by a library professional who raises the researcher's awareness of relevant information sources including the local residents' action group website. The research findings about local industries and residents' demographics bring a range of health and social needs to the practitioners' attention. Meanwhile, clinic staff add details of their specialist strengths and interests to a shared online document, laying a foundation for interprofessional learning and collaborative initiatives. This later evolves into a private online community for staff to discuss relevant research and share community education ideas. The information professional moderates this community and guides practitioners in further extending their professional learning networks beyond clinic colleagues.

To provide meaningful context for their social living lab the practitioners engage in a round table discussion about the health and social impacts of child obesity for their own practice and the wider community. The practitioners also share anecdotes from their particular physiological, nutritional and psychological perspectives.

After identifying a gap in their collective knowledge about socio-cultural factors of child obesity, the practitioners participate in a webinar on this topic with an international expert, organised by the information professional. Contributing to the practitioners' understanding, community members relate their lived experiences and concerns around child obesity via a live Q & A panel and a blog hosted by the local library. A title for the social living lab – *Healthy eating for active children* – is selected via an online poll open to all professional and community stakeholders. As the poll also identifies various information literacy learning needs that include discerning the trustworthiness of different dieting websites, the library provides a series of drop-in workshops.

Commentary: The activities of this Exploration–Experimentation phase would enable participants to experience the expansive characteristic of informed learning as they discover and share relevant information and widen their knowledge of child obesity as a complex problem with social, psychological and physical health dimensions (Godley & Russell-Mayhew, 2010; Karnik & Kanekar, 2012; Sahoo et al., 2015). The initiatives are balanced in enabling participants to develop critical and ethical information using strategies while simultaneously learning about obesity. Regarding interprofessional education principles, participants are also engaging in the process of learning as a continuum involving medical care, health outcomes and wellbeing, and achieving the outcome of engendering interprofessional capability. Attending to both interprofessional education principles and informed learning characteristics, the social living lab is grounded in authentic evidence about the current problem of child obesity as it affects local inhabitants. In addition to developing new knowledge, the practitioners are experiencing new digital technologies as they develop their own professional learning networks (Nussbaum-Beach & Hall, 2012; Oddone, Hughes & Lupton, 2019).

6.3 Co-creation phase

In the social living lab's Co-creation phase the clinic's nutritionist leads a forum at the public library with school students and community organisations to brainstorm ideas and practical

strategies for healthy eating and exercise. The outcomes include a digital animation competition and a sustainable community garden, run respectively by a local artist and a gardening club. Access to free software is available via the public library's computers and website. Workshops at the library enable participants' learning and use of relevant technology. These workshops also support the formation of a local digital animation peer group. To raise community awareness about nutritious food choices, the students' animations are displayed on a digital board at the local shopping centre.

These activities attract new living lab participants and generate further activities. Volunteers from a food distribution charity use their distribution app to provide vegetables from the community garden to homeless people. Health practitioners and other community members with an interest in gardening work voluntarily alongside young people and provide information about healthy lifestyles in a low-key way. The library supplements this information by creating a 'happy eating' site where students can chat and share photos of their garden products and the nutritious dishes they create.

Commentary: This Co-creation phase would enable participants to undertake activities that involve the collaborative and creative characteristics of informed learning, and the interprofessional education process of enabling professions to learn with, from and about each other, and achieve the outcome of information dissemination. The social living lab is also transformative in an informed learning sense in various ways that include: enabling participants to experience different ways of using information to learn while developing greater understanding of the social and emotional experience of young people related to food and body image; connecting digitally and in person with like-minded peers; applying new knowledge to practical solutions such as sustainable gardening for exercise and healthier diet. These activities would also align with interprofessional outcomes of joint action to improve services and instigate change, and improved outcomes for individuals and communities.

6.4 Evaluation phase

Ongoing Evaluation of the social living lab and reflection on its process and outcomes ensure its relevance and guide continuing action. A survey of participants provides data from their varied perspectives on the impacts of the social living lab and suggestions for further collaborative initiatives. Health science students from the local university assist with gathering and analysing responses for an assignment, guided by information literacy educators from the university library. In addition, health professionals write and share reflective commentary about the implications of the survey data via an obesity-related blog.

Commentary: The activities in this phase of the social living lab promote evaluation and reflection as a vital aspect of informed learning and interprofessional education. They would foster responsible and critical use of evidence and support the informed learning goal of making sense of information use and learning. Reflection could expand participants' understanding of obesity issues from differing perspectives.

For students, involvement in data collection and analysis offers an authentic opportunity to experience meaningful research and engage in curriculum-embedded information literacy learning. Reflecting on the survey process and results helps students make connections between nutrition-related study and real-world practice. For health professionals, reflection would support the interprofessional education process of reviewing policy and practice critically from different perspectives and an evidence-based approach to improving patient care.

7. Discussion: Benefits, limitations and opportunities

The proposed social living labs for informed learning offer an innovative educational response to social change and digital disruption for professionals and community members alike. We

anticipate that this approach could support the development of current knowledge and information using capabilities that are essential for navigating the contemporary information-intensive environment (Klerings et al., 2015; Schardt, 2011). It has apparent potential to support interprofessional education and the development of health information literacy.
Social living labs for informed learning would seem well suited to addressing complex social problems. The theoretical and practical exploration presented in this paper suggests that this approach could contribute a range of benefits such as:

(i) the separate strengths of informed learning, social living labs and interprofessional education;
(ii) the complementary capacity of three educational constructs in combination;
(iii) suited to addressing community healthcare challenges;
(iv) meeting needs for interprofessional learning in healthcare and other fields;
(v) development of contemporary employment capabilities including digital land health information literacies;
(vi) operational flexibility for application across varied fields beyond healthcare;
(vii) future-focused and continuous learning.

These benefits are discussed below.

First, social living labs for informed learning draw on the separate strengths of informed learning, interprofessional education and social living labs. Each has a distinct purpose and potential to contribute in varied workplace and community settings, including healthcare.

Informed learning (Bruce & Hughes, 2010) enables learners to develop essential capabilities for negotiating the challenges of complex information environments and evolving digital technologies, as identified earlier. With an active and inclusive orientation, and support for using information critically and creatively to learn, it can play a vital role in community-based education that seeks to enhance social wellbeing. Here, informed learning meets two crucial needs by simultaneously extending individuals' information and digital literacies and their knowledge about social issues that concern or interest them. It supports real-life problem-solving, meaningful information experience and relevant learning outcomes.

Interprofessional education (Barr, et al., 2017) plays an important role in developing capabilities for collaboration in complex cross-disciplinary and community settings. It makes a particularly rich contribution in modelling a values and outcomes-based approach to learning especially in the socially challenging context of healthcare.

Social living labs (Dezuanni et al., 2017; Franz, 2015) bring two key benefits in providing an informal learning context and supporting an iterative problem-solving process. They can bring multiple stakeholders together in a flexible and inclusive environment that is conducive to the sharing of information, experience and expertise among participants from diverse backgrounds. As the cited research and this paper's scenario indicate, social living labs might create welcoming spaces where marginalised people, or those struggling with personal problems such as obesity and body image, might find social connection and informal support.

Second, this approach draws integrity and sustainability from the integration of three different educational constructs. In combination informed learning, interprofessional education and social living labs have a complementary capacity. Thus, social living labs can provide a conducive setting for informed and interprofessional learning. Informed learning and social living labs support socially-oriented problem-solving, while interprofessional education forges educationally productive relationships between professionals and community members.

Third, social living labs for informed learning are well suited to addressing community healthcare challenges where the complex information and learning needs of multiple

stakeholders call for an active, inclusive community education approach. In comparison to the directive – even shaming – nature of some public health campaigns, social living labs foster participant-led learning. They might enable participants to take greater control of their own health education and extend health information literacy across the whole community. In a social living lab, like the healthy eating scenario, individuals might gain motivation and perhaps enjoyment through various information sharing and creative activities with a common purpose. Fourth, for healthcare professionals, social living labs for informed learning could help meet the identified need to extend interprofessional learning beyond formal education in authentic post-qualification contexts (Barr et al., 2017). They might also raise awareness of the benefits of interprofessional practice, especially among those who generally work independently in more traditional academic or clinical settings where it is not mandated (Godley & Russell-Mayhew, 2010).

Within and beyond healthcare where there is an emphasis on continuing learning and community engagement, social living labs for informed learning potentially generate wider outcomes for professionals than more tightly focused training workshops and programmes. In contrast to professional development that is often fragmented and de-contextualised, it enables interprofessional learning that is co-created *with* rather than provided *for* participants (Barr et al., 2017). Social living labs also enable cross-over between professional and personal interests. For example, a health professional might share their passion for gardening or creative talents to enrich children's learning about food growing and healthy eating. The emphasis on shared interest and personal buy-in could help overcome negative responses and minimal impacts of formal professional development that are associated with an 'empty exercise in compliance' (Calvert, 2016, p.2).

Fifth, from a wider employment perspective, the emphasis on informed learning enables professionals to develop capabilities such as digital literacy, collaboration and communication, critical and creative thinking, all of which are necessary for changing work contexts (Australian Government. Productivity Commission, 2016; Mason et al., 2017; OECD, 2016). In particular, informed learning's emphasis on using information critically and creatively to learn could enhance healthcare practitioners' application of information and digital skills that are considered fundamental to their foundational and continuing interprofessional education (Barr et al., 2017).

Sixth, the operational flexibility of social living labs for informed learning would allow their application across a variety of fields to other social problems needing widespread awareness and action. This approach might then assist an identified goal of interprofessional education to extend to other disciplines beyond the health and social care fields (Barr et al., 2017). For example, social living labs might be introduced into education, law and policing, as well as cultural institutions such as galleries, libraries, archives and museums where interprofessional working and community engagement and co-creation are increasingly important (Estrada Grajales, Foth, Mitchell, & Caldwell, 2019, in press).

Seventh, social living labs for informed learning are future-focused and support continuous learning. As they develop organically, they foster serendipitous learning (Freeth, Savin-Baden & Thistlethwaite, 2018) that responds to emergent needs. By providing 'spaces of encounter' (Franz, 2015) social living labs can facilitate professional-community connections between individuals who have shared interests and information needs but may not otherwise be connected. Over time, a social living lab may expand as a connected learning ecology (Lankester, Hughes & Foth, 2017) or hub (Bilandzic & Foth, 2017) that involves professionals, interested lay people, learning spaces, technologies and products around a particular interest or concern. Links may continue to form between members of different social living labs as they become aware of each other. For example, in Townsville connections developed between some participants from the Mixhaus and Food Rescue social living labs through shared community

wellbeing goals and information needs around sustainability (Foth, Lankester & Hughes, 2017; Hughes, Wolf & Foth, 2017).

In addition to these practical benefits, the newly identified synergy between informed learning, interprofessional education and social living labs advances theory building in all three domains. The new model of social living labs for informed learning is a first step in this direction. In addition, our comparative analysis of their respective principles found aspects in one that might enhance the other. For example, the incorporation of 'values' in interprofessional education could be more explicitly articulated in informed learning. Moreover, with their focus on healthcare, the principles of interprofessional education could have particular relevance for ongoing theorisation of health information literacy.

This paper also highlights the potential of interdisciplinary research to promote innovative learning approaches. As shown, research that involves individuals from varied social and professional backgrounds can promote cross-pollination of ideas that might otherwise be isolated within particular fields. An inclusive approach such as this can produce fresh understanding and practices for socially oriented collaborative learning in community settings. Despite these evident benefits, the social living labs for informed learning approach is still evolving and it has several limitations that require further attention. In particular, this approach lacks established guidelines or practical evaluation. The organic development and loosely defined leadership of social living labs might challenge their sustainability in community settings and complicate their scheduling and awarding of credit within formal healthcare education. Tension may arise between the democratic, self-directed aim of social living labs and the practicalities of implementing an evolving web of initiatives with diverse participants. The intentionally fluid roles of participants and facilitators add to this complexity. Social living labs facilitators might need learning and peer support in democratic, participatory workshop practices (Frauenberger, Foth & Fitzpatrick, 2018). Further possible challenges are associated with locating inclusive public spaces where people feel welcome, supported and encouraged to contribute irrespective of their social or educational background.

The practice framework (Table 2) and the illustrative scenario partially address these challenges. They provide an initial guide to the design and implementation of social living labs for informed learning for workplace and community groups seeking to address particular social problems. There are compelling opportunities here for information professionals (especially information literacy educators) and libraries to engage productively with their communities. However, there remains extensive need for further research to evaluate the proposed approach, and to explore alternative social living labs approaches for differing healthcare and community contexts and specific information needs including health information literacy.

8. Conclusion

Responding to educational needs for changing work and social environments, this paper has proposed a conceptual model and practice framework for social living labs for informed learning. By integrating informed learning, interprofessional education and social living labs, this approach enables professional and community stakeholders to collaboratively address social concerns such as child obesity. The hypothetical scenario and subsequent discussion have demonstrated its potential application across healthcare and possibly other interdisciplinary fields. The paper furthers information literacy research and practice by identifying interdisciplinary synergies between informed learning, community development and healthcare. While expanding the repertoire of health information literacy, it also highlights a wider role for informed learning in professional and community education.

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References

Australian Government. Productivity Commission (2016). *Digital disruption: What do governments need to do?* Commission Research Paper. Canberra: Commonwealth of Australia. Available at: http://www.pc.gov.au/research/completed/digital-disruption

Baller, S., Dutta, S. & Lanvin, B. (2016). *The global information technology report 2016: Innovating in the digital economy*. Geneva: World Economic Forum. Available at: http://reports.weforum.org/global-information-technology-report-2016/

Ballon, P. & Schuurman, D. (2015). Living labs: Concepts, tools and cases. *Info, 17(4)*. https://doi.org/10.1108/info-04-2015-0024

Barr, H., Ford, J., Gray, R., Helme, M., Hutchings, M., Low, H., Machin, A. & Reeves, S. (2017). *Interprofessional education guidelines*. Centre for the Advancement of Interprofessional Education. Available at: https://www.caipe.org/resources/publications/caipe-2017-interprofessional-education-guidelines-barr-h-ford-j-gray-r-helme-m-hutchings-m-low-h-machin-reeves-s

Bilandzic, M. & Foth, M. (2017). Designing hubs for connected learning: Social, spatial and technological insights from coworking, hackerpaces and meetup groups. In: L. Carvalho, P. Goodyear & M. de Laat (eds.), *Place-based spaces for networked learning*. Abingdon, UK: Routledge, pp.191–206.

Bruce, C.S. (2008). *Informed learning*. Chicago: Association of College Research Libraries.

Bruce, C. S. & Hughes, H. (2010). Informed learning: A pedagogical construct attending simultaneously to information use and learning. *Library and Information Science Research, 32(4)*, A2–A8. https://doi.org/10.1016/j.lisr.2010.07.013

Bruce, C. S., Hughes, H. & Somerville, M. M. (2012). Supporting informed learners in the 21st century. *Library Trends, 60(3)*, 522–545. https://doi.org/10.1353/lib.2012.0009

Bruce, C. S., Somerville, M. M., Stoodley, I. D. & Partridge, H. L. (2013). Diversifying information literacy research: An informed learning perspective. In: M. Hepworth & G. Walton (eds.), *Developing people's information capabilities: Fostering information literacy in educational, workplace and community contexts*. Bingley, UK: Emerald, pp.223–240.

Calvert, L. (2016). *Moving from compliance to agency: What teachers need to make professional learning work*. Oxford, OH: Learning Forward and NCTAF. Available at: https://learningforward.org/publications/recent-research-and-reports

Canadian Interprofessional Health Collaborative. (2010). *A national interprofessional competency framework*. Available at: https://www.cihc.ca/files/CIHC_IPCompetencies_Feb1210.pdf

Dezuanni, M., Foth, M., Mallan, K., & Hughes, H. & Osborne, R. (2017). Social living labs for digital participation and connected learning. In: M. Dezuanni, M. Foth, K. Mallan & H. Hughes (eds.), *Digital participation through social living labs: Valuing local knowledge, enhancing engagement*. Cambridge, M.A.: Chandos, pp.1–17. https://doi.org/10.1016/B978-0-08-102059-3.00001-0

Dietz, W. H., Belay, B., Bradley, D., Kahan, S., Muth, N. D., Sanchez, E. & Solomon, L. (2017). *A model framework that integrates community and clinical systems for the prevention and management of obesity and other chronic diseases*. Washington, DC: National Academy of Medicine. https://doi.org/10.31478/201701b

Estrada Grajales, C., Foth, M., Mitchell, P. & Caldwell, G. A. (2019, in press). The museum in the smart city: The role of cultural institutions in co-creating urban imaginaries. In: K. Willis & A. Aurigi (eds.), *The Routledge companion to smart cities*. Abingdon, UK: Routledge.

Foth, M., Lankester, A. & Hughes, H. (2017). Mixhaus: Dissolving boundaries with a community makerspace. In: M. Dezuanni, M. Foth, K. Mallan & H. Hughes (eds.), *Digital participation through social living labs: Valuing local knowledge, enhancing engagement*. Cambridge, M.A.: Chandos, pp.97–116. https://doi.org/10.1016/B978-0-08-102059-3.00006-X

Franz, Y. (2015) Designing social living labs in urban research. *Info 17(4)*, 53–66. https://doi.org/10.1108/info-01-2015-0008

Frauenberger, C., Foth, M. & Fitzpatrick, G. (2018). On scale, dialectics, and affect: Pathways for proliferating participatory design. In: *Proceedings of the Participatory Design Conference (PDC)*, Hasselt, Belgium, 20-24 August. New York, NY: ACM. https://doi.org/10.1145/3210586.3210591

Freeth, D., Savin-Baden, M. & Thistlethwaite, J. (2018). In: T. Swanwick, K. Forrest & B. C. O'Brien (eds.), *Understanding medical education: Evidence, theory and practice* (3rd edn.) Hoboken, NJ: Wiley-Blackwell, pp.191–206. https://doi.org/10.1002/9781119373780.ch14

Garcia Robles, A., Hirvikoski, T., Schuurman, D. & Stokes, L. (2016). *Introducing ENoLL and its living lab community*. Brussels: European Network of Living Labs. Available at: https://issuu.com/enoll/docs/enoll-print?e=23453591/33195876

Godley, J. & Russell-Mayhew, S. (2010). Interprofessional relationships in the field of obesity: Data from Canada. *Journal of Research in Interprofessional Practice and Education, 1(2)*, 88–108. https://doi.org/10.22230/jripe.2010v1n2a22

Hemp, P. (2009). Death by information overload. *Harvard Business Review, 87(9)*, 82–89.

Hughes, H., Foth, M., Dezuanni, M. L., Mallan, K. & Allan, C. (2018) Fostering digital participation and communication through social living labs: A qualitative case study from regional Australia. *Communication Research and Practice, 4(2)*, 183–206. https://doi.org/10.1080/22041451.2017.1287032

Hughes, H., Wolf, R. & Foth, M. (2017). Informed digital learning through social living labs as participatory methodology: The case of Food Rescue Townsville. *Information and Learning Science, 118 (9/10)*, 518–534. https://doi.org/10.1108/ILS-05-2017-0041

Karnik, S. & Kanekar, A. (2012). Childhood obesity: A global public health crisis. *International Journal of Preventive Medicine, 3(1)*, 1–7.

Kastner, M., Sayal, R., Oliver, D., Straus, S. E. & Dolovich, L. (2017). Sustainability and scalability of a volunteer based primary care intervention (Health TAPESTRY): A mixed-methods analysis. *BMC Health Services Research, 514*. https://doi.org/10.1186/s12913-017-2468-9

Kettle, M. (2017). Connecting digital participation and informal language education: Home tutors and migrants teaching and learning in a rural community. In: M. Dezuanni, M. Foth, K. Mallan & H. Hughes (eds.), *Digital participation through social living labs: Valuing local knowledge, enhancing engagement*. Cambridge, M.A.: Chandos, pp.173–190. https://doi.org/10.1016/B978-0-08-102059-3.00009-5

Klerings, I., Weinhandl, A .S. & Thaler, K. J. (2015). Information overload in healthcare: Too much of a good thing? *Zeitschrift für Evidenz, Fortbildung und Qualität im Gesundheitswesen (Journal of Evidence and Quality in Health Care), 109(4–5)*, 285–290. https://doi.org/10.1016/j.zefq.2015.06.005

Lankester, A., Hughes, H. & Foth, M. (2017). Mapping a connected learning ecology to foster digital participation in regional communities. In: M. Dezuanni, M. Foth, K. Mallan & H. Hughes (eds.), *Digital participation through social living labs: Valuing local knowledge, enhancing engagement*. Cambridge, M.A.: Chandos, pp.141–171. https://doi.org/10.1016/B978-0-08-102059-3.00008-3

Lupton, D. (2013). The digitally engaged patient: Self-monitoring and self-care in the digital health era. *Social Theory and Health, 11(3)*, 256–270. https://doi.org/10.1057/sth.2013.10

Marton, F. & Booth, S. (1997). *Learning and awareness*. Mahwah, NJ: Erlbaum.

Mason, C., Fleming, A., Paxton, G. & Singh, J. (2017). *Lifelong participation through digital technology*. CSIRO. Retrieved from https://research.csiro.au/lifelong/wp-content/uploads/sites/101/2017/02/16-00818_Data61_Report_40pp_LifeLong170213_WEB.pdf

McKimm, J. & McLean, M. (2011). Developing a global health practitioner: Time to act? *Medical Teacher, 33*, 626–631. https://doi.org/10.3109/0142159X.2011.590245

Nandan, M. & Scott, P. A. (2014). Interprofessional practice and education: Holistic approaches to complex health care challenges. *Journal of Allied Health, 43(3)*, 150–6.

Nussbaum-Beach, S. & Hall, L. R. (2012). *The connected educator: Learning and leading in a digital age*. Bloomington, IN: Solution Tree Press.

Oddone, K., Hughes, H. & Lupton, M. (2019). Teachers as connected professionals: A model to support professional learning through personal learning networks. *The International Review of Research in Open and Distributed Learning, 20(3)*, 102–120. https://doi.org/10.19173/irrodl.v20i4.4082

Organisation for Economic Cooperation and Development (OECD) (2016). *Skills for a digital world: Policy brief on the future of work*. Paris: OECD. Available at: http://www.oecd.org/employment/future-of-work/

Primary Care Workforce Commission (2015).*The future of primary care: Creating teams for tomorrow*. Health Education England. Available at: https://www.hee.nhs.uk/our-work/primary-care-workforce-commission

Royal College of General Practitioners (2014). *An inquiry into patient centred care in the 21st century: Implications for general practice and primary care*. Available at: http://www.rcgp.org.uk/policy/rcgp-policy-areas/inquiry-into-patient-centred-care-in-the-21st-century.aspx

Sahoo, K., Sahoo, B., Choudhury, A. K., Sofi, N. Y., Kumar, R. & Bhadoria, A. S. (2015). Childhood obesity: Causes and consequences. *Journal of Family Medicine and Primary Care, 4(2)*,187–192. https://doi.org/10.4103/2249-4863.154628

Schardt, C. (2011). Health information literacy meets evidence-based practice. *Journal of the Medical Library Association: JMLA, 99(1)*, 1–2. https://doi.org/10.3163/1536-5050.99.1.001

Schumacher, J. (2015). *Alcotra Innovation Project: Living labs definition, harmonization cube indicators and good practices*. Available at: http://www.alcotra-innovation.eu/progetto/doc/Short_guide_on_Living_Labs_and_some_good_practices.pdf

Smith, J., Holder, H., Edwards, N., Maybin, J., Parker, H., Rosen, R. & Walsh, N. (2013). *Securing the future of general practice: New models of primary care*. London: Nuffield Trust. Available at: https://www.nuffieldtrust.org.uk/files/2017-01/securing-the-future-general-practice-summary-web-final.pdf

World Health Organisation (2010*). Framework for action on interprofessional education and collaborative practice*. Available at: http://www.who.int/hrh/resources/framework_action/en/

Xyrichis, A. & Lowton, K. (2008). What fosters or prevents interprofessional teamworking in primary and community care? A literature review. *International Journal of Nursing Studies, 45 (1)*, 140–153. https://doi.org/10.1016/j.ijnurstu.2007.01.015

Yates, C., Stoodley, I. D., Partridge, H. L., Bruce, C. S., Cooper, H., Day, G. & Edwards, S. L. (2012). Exploring health information use by older Australians within everyday life. *Library Trends, 60(3)*, pp. 460–478. https://doi.org/10.1353/lib.2012.0004

Appendix 1

Example of the Practice Framework applied to the Healthy Eating for Active Children social living lab

AIMS	ACTIVITIES	OUTCOMES
Social living lab: Exploration–Experimentation		
Contextualised Expansive Grounded	Researcher profiles local community.	Demographic data to inform planning & professional practice.
Collaborative Eclectic Expansive	Librarian advises health practitioners about information sources.	Raised practitioner awareness of community healthcare needs. Established library-practitioner link.
Eclectic Grounded	Practitioners indicate specialist strengths and interests.	Shared information - foundation for interprofessional learning & initiatives.
Active Balanced	Practitioners set up and participate in online professional learning network.	Shared ideas and resources. Developed digital literacy.
Active Grounded	Practitioners discuss health and social impacts of child obesity.	Shared interdisciplinary expertise. Identified learning needs.
Active Collaborative Expansive	Librarian and practitioners participate in webinar on socio-cultural factors of child obesity.	Extended knowledge beyond healthcare – understanding of cultural factors of child obesity.
Active Inclusive	Professional-community Q & A panel and blog hosted by local library.	Revealed lived experiences of child obesity, identity & body image.
Balanced Contextualised	Online poll of professional and community stakeholders.	Information and learning needs identified.
Balanced Expansive	Library provides workshops on trustworthiness of dieting web sites.	Used info critically and ethically to learn about health and nutrition.
Social living lab: Co-creation		
Collaborative Inclusive	Nutritionist leads forum at library with school students & community groups.	Brainstormed ideas & developed practical strategies for healthy eating.
Active Inclusive	Practitioners & young people work in sustainable community garden.	Information shared, skills developed, and healthy lifestyle goals set.
Balanced Creative	Artist-led digital animation competition for youth in library maker space.	Digital animation peer group formed. Digital production skills developed.
Creative Inclusive	Digital animations displayed at local shopping centre.	Raised community awareness about nutritious food choices.
Socially responsible	Volunteers distribute community garden vegetables to homeless.	Developed awareness of and responded to community food needs.
Balanced Creative	Library creates web site to share photos of garden products & dishes.	Information used creatively to learn health benefits of outdoor activity.
Transformative	Varied activities enable interaction & information sharing across the community & between professionals.	Experienced different ways of using information to learn about obesity - led to new knowledge & collective action.
Social living lab: Evaluation		
Balanced Collaborative Expansive Grounded	Participant survey on impacts & suggestions for further action. Uni students assist data analysis guided by library educators.	Evidence to guide further initiatives. Health science students developed research capabilities in authentic context.
Expansive Reflective	Health professionals write & share reflections via obesity-related blog about survey data implications.	Expanded professional learning and understanding of obesity issues from differing perspectives.