

# Understanding the Context of Learning in an Online Social Network for Health Professionals' Informal Learning

Xin LI <sup>a,1</sup>, Kathleen GRAY <sup>a</sup>, Karin VERSPOOR <sup>a</sup>, and Stephen BARNETT <sup>b</sup>

<sup>a</sup>Health and Biomedical Informatics Research Centre, University of Melbourne

<sup>b</sup>General Practice Academic Unit, Graduate School of Medicine, University of Wollongong

**Abstract.** Online social networks (OSN) enable health professionals to learn informally, for example by sharing medical knowledge, or discussing practice management challenges and clinical issues. Understanding the learning context in OSN is necessary to get a complete picture of the learning process, in order to better support this type of learning. This study proposes critical contextual factors for understanding the learning context in OSN for health professionals, and demonstrates how these contextual factors can be used to analyse the learning context in a designated online learning environment for health professionals.

**Keywords.** Context analysis, health professional education, online social networks

## 1. Introduction

As medical knowledge expands and health care delivery becomes more complex, health professionals must commit to continuous learning to maintain up-to-date knowledge and skills. One approach to meeting their learning and development needs is through engagement in online social networks (OSN) [1]. OSN have been found useful to reduce professional isolation and support anytime-anywhere peer-to-peer interaction at scale. Also, they are thought to contribute to improving continuing professional development (CPD).

There are many OSN targeted towards health professionals but they appear to fail to support broader learning objectives. It has been recognised that there is a lack of understanding about how health professionals learn in OSN, making it difficult to design and manage this type of learning [2]. Understanding and evaluating the process of learning in OSN is important to realise the full potential of OSN for health professionals' learning [3].

Previous studies investigated learning behaviours by identifying the patterns of the interaction among health professionals [4, 5], and analysed textual dialogue among health professionals to understand how those dialogues support the process of learning [6]. However, there is insufficient attention paid to the understanding of learning context that is necessary to get a complete picture of the learning process in OSN [7].

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<sup>1</sup> Corresponding Author: Xin Li, Health and Biomedical Informatics Centre, University of Melbourne, Parkville VIC 3010 Australia; E-mail: xinli87@gmail.com.

All learning occurs within a context. The nature of the context and how this context relates to the concepts being learnt has been widely shown to have an effect on learning outcomes [9]. Dey [8] gave the most widely accepted definition for context, which is “any information that can be used to characterize the situation of an entity” (e.g., a learner). The nature of learning occurring in OSN is self-directed and this requires health professionals to have self-regulated learning skills [10], but the ability to self-regulate learning is shaped by both personal-psychological and contextual factors [11]. Further, it is essential that these processes be learned ‘in context’ or in relation to the specific tasks of interest, in order for self-directed learning to be relevant to medical education [12].

This study aims to provide an understanding of learning context in OSN for health professionals’ learning in two ways. First, through the review of literature, we identify the contextual factors that are critical for analysing the context of learning in OSN for health professionals. Then we use these factors to analyse context data collected from a designated online learning environment for health professionals. The intention of this research is to enable OSN operators to use such contextual factors to facilitate meaningful learning processes and improve learners’ learning experiences in OSN.

2. Contextual Factors for Health Professionals’ Informal Learning in OSN

The variety and volume of learning activity occurred in OSN demands a standard model for consistent analysis of context. Our literature review of context models previously proposed for online learning shows inconsistent approaches. Here, we identify the contextual factors (in Table 1) that we consider to be critical for analysing the informal learning context in OSN for health professionals, based on our synthesis of the context models in the literature [9, 13].

Table 1. Contextual factors for health professionals’ informal learning in OSN

Context factor	Description
Learner factor	
Demographics	Age, gender, practice location, etc.
Work experience	Job role, year of experience, other professional activity, etc.
Education	Qualification, professional memberships, etc.
Learning interest	Specialised clinical interest, e.g. General Practice, mental health
Environment factor	
Time and Location	The learner’s regular time and location of learning
Activity	The external learning activities that the learner is currently or will be involved in in future, apart from the interaction of OSN under study.
Relations	The social relation a learner has with other people outside of OSN, e.g. in their workplace.
Recognition	The ways of recognising learners’ effective learning in OSN, e.g. through provision of CPD points
Application opportunities	Perception, and actual application of learned information or skills

3. Methods

3.1. Dataset

To understand the context of learning in OSN for health professionals, we conducted context analysis based on the contextual factors proposed above. The context data were

collected from the database of an online discussion forum provided by a health professional OSN host organization in Australia. The online forum was established in 2009 specifically for registered health practitioners and had more than 10,000 members. It was set up for doctors to discuss industry issues, share best practices and promote conversation within the health community.

For this study, we focused on the forum participants ( $N = 48$ ) who contributed to forum discussions over three consecutive years from the period 2012 to 2014. Excluding two moderators, we collected the context data of 46 active participants. By conducting context analysis on the active participants, this study identifies common aspects of learning context that may be shared among active group in this community.

### 3.2. Procedures

We retrieved all data relevant to each contextual factor from the *user* table of the forum database via SQL Select statements. After performing data cleansing, we firstly analysed 'demographics' and 'education background' by using raw data (*date of birth, gender, practice location, university, college membership*), then we obtained context information for other contextual factors by processing raw data. We extracted and analysed the free text in data attribute *about me* to obtain context information for 'work experience' and 'learning interest. We also analysed the interaction history to obtain the preferred time and location the learners go online.

## 4. Results and Discussion

### 4.1. Learner Factors

*Demographics.* Most the participants were males aged 55+ years, which shows that mature health professionals are more actively participated in the OSN. This implies that it is important to consider the learning needs of older doctors when designing the learning in OSN. Using the Australian Standard Geographical Classification, we found that the majority of participants were practicing in a major city in the most populated Australian states (i.e. Queensland, New South Wales, and Victoria). These findings overturn assumptions that this type of learning is most relevant to professionals in regional and remote areas [14].

*Work experience.* 96% of the participants were General Practitioners (GPs). Of those, 56% were principal GPs and/or practice owners, implying that those with supervisory and/or management responsibility are more active in OSN. The distribution of years of experience is consistent with the age factor, which confirms that more experienced health professionals with 30+ years of work experience were more active in OSN for learning. Examining their practice status showed that 38% participants were retired or semi-retired, which reveal that even in retirement GPs, are willing to engage, and keen to using the OSN to maintain connection with peers and overcome isolation [15]. In addition, we identified 22% participants as having 'portfolio careers', that is, extra-professional activities. For example, they were also working as a medical officer at one or more hospitals, teaching or lecturing at a university, providing online consultations, involved in community services, etc. This shows that even very busy professionals were prepared to commit to learning in OSN.

*Educational background.* Most participants (72%) graduated in Australia, and 22% overseas. This suggests that the learning design of OSN should consider cultural and linguistic differences in the backgrounds of health professionals. Most participants (61%) are Fellows of the Royal Australian College of General Practitioners (RACGP), indicating that participants were more likely to hold an advanced qualification than be less qualified GPs.

*Learning interest.* All participants expressed major interest in general practice. In addition, more than half of the participants (54%) were interested in and/or had developed sub-specialties. The clinical areas of most interest among the participants were dermatology, women's health, chronic disease management, general medicine, diabetes, and sports medicine. This finding is somewhat consistent with a recent national GP survey that identified the top three clinical areas of interest to GPs as chronic pain management, cardiovascular health and diabetes [16]. This implies that GPs are keen to develop sub-specialised areas, and thus supporting their learning by facilitating more discussion on clinical topics is recommended.

#### 4.2. Environment Factors

Although environmental context is critical to the design and management of learning in OSN [12], it was possible to collect only limited environmental data (i.e. time, location) from the dataset available. None of context data relating to learner activity, relations, recognition, and application opportunities were collected in this forum.

*Time.* By analysing the interaction history of the participants, we identified the time of day participants prefer to go online, revealing their self-directed learning schedules. We found that evening was more popular than morning or afternoon; some participants were online after midnight, or very early in the morning.

*Location.* Since evening was the preferred learning time for the participants, we can infer that a home office is likely to be their physical learning location. However, for those doctors who don't work during normal office hours (e.g. those who do shift work or work in hospitals) their physical location for learning online may not be in their home office but at workplace. Future implementation of the forum may consider tracking IP address of logged computers to obtain better understanding of their physical learning environment so appropriate learning content and activity can be suggested.

### 5. Conclusion and Future Work

It is important to understand contextual information about health professionals' informal learning in OSN, in order to better support this learning. This study suggested contextual factors that are critical for understanding learning context, and demonstrated how these contextual factors could be analysed, in the case of a small number of active participants in an online discussion forum. The findings are potentially useful to OSN operators aiming to increase participant engagement. The analysis of learning context help gain an understanding of these participants' experience, preferences and tasks, and thus contribute to developing more personalised and just-in-time learning for them.

The context data that were available in this forum were not complete, in particular environmental data. This study proved useful by identifying missing context information that would be worthwhile for the OSN operator to collect systematically in future, including learner activity, relations, recognition, and application opportunities.

This context information has important implications for the design and management of learning in OSN. In terms of the acquisition of this context information, not all could be collected automatically through the technical system; some information relied on manual input by participants (for example personal profile details). This could change in future if an OSN enabled participants to import relevant information about them from other online professional databases (for example, LinkedIn).

This study aims to provide an understanding of the learning context of health professionals in OSN. While the sample of our context data is too small to infer the general characteristics of the health practitioners in OSN, it shows a possible way for OSN operators to increase learner engagement by collecting and analysing the data of learning context in a designated online learning environment. In our future work, we plan to validate the findings of learning context, and use them to interpret the patterns of learning interaction and content in this OSN. Also, it is useful to understand how different contextual factors may influence the nature and outcome of learning in this OSN for health professionals.

## References

- [1] Cheston, C.C., T.E. Flickinger, and M.S. Chisolm, *Social media use in medical education: a systematic review*. Academic Medicine, 2013. **88**(6): p. 893-901.
- [2] Institute of Medicine, *Redesigning Continuing Education in the Health Professions*. 2010, National Academies Press: Washington, DC.
- [3] Sandars, J., P. Jaye, and K. Walsh, *Networked Learning in Continuing Medical Education: New Directions For The Evaluation of Effectiveness Perspective in Network-Based Continuing Medical Education: Social Media and Professional Development*, T. G., Editor. 2014, Nova Science: New York. p. 89-100.
- [4] Stewart, S.A. and S.S.R. Abidi, *Using Social Network Analysis to Study the Knowledge Sharing Patterns of Health Professionals Using Web 2.0 Tools*. Biomedical Engineering Systems and Technologies, 2013. **273**: p. 335-352.
- [5] Li, X., et al., *Analysing Health Professionals' Learning Interactions in Online Social Networks: A Social Network Analysis Approach*, in *Health Informatics New Zealand Conference*. 2015: Christchurch, New Zealand.
- [6] Li, X., et al., *Discovery of Learning Topics in an Online Social Network for Health Professionals*, in *Health Data Analytics Conference*. 2016: Brisbane, Australia.
- [7] De Laat, M. and B. Schreurs, *Visualizing Informal Professional Development Networks: Building a Case for Learning Analytics in the Workplace*. American Behavioral Scientist, 2013. **57**(10): p. 1421-1438.
- [8] Dey, A.K., *Understanding and using context*. Personal and ubiquitous computing, 2001. **5**(1): p. 4-7.
- [9] Tessmer, M. and R.C. Richey, *The role of context in learning and instructional design*. Educational technology research and development, 1997. **45**(2): p. 85-115.
- [10] Sandars, J. and K. Walsh, *The Challenge of Creating Personalised Learning for Continuing Medical Education: A Network Perspective*, in *Network-Based Continuing Medical Education: Social Media and Professional Development*, T. G., Editor. 2014, Nova Science: New York. p. 21-33.
- [11] Zimmerman, B.J. and D.H. Schunk, *Self-regulated learning and academic achievement: Theory, research, and practice*. 2012: Springer Science & Business Media.
- [12] Cleary, T., et al., *Self-regulated learning in medical education*, in *Oxford textbook of medical education*. 2013. p. 465-477.
- [13] Zimmermann, A., A. Lorenz, and R. Oppermann. *An operational definition of context*. in *International and Interdisciplinary Conference on Modeling and Using Context*. 2007. Springer.
- [14] Brown, J., C. Ryan, and A. Harris, *How doctors view and use social media: a national survey*. Journal of medical Internet research, 2014. **16**(12): p. e267.
- [15] Barnett, S., et al., *A virtual community of practice for general practice training: a preimplementation survey*. JMIR Medical Education, 2016. **2**(2).
- [16] NPS MedicineWise, *National GP survey 2014*. 2014, NPS MedicineWise.