How Registered Nurses balance limited resources in order to maintain competence: A Grounded theory study

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Abstract

Background

Nurses have limited time outside of work for continuing professional development. Consequently, strategies need to be explored to enable them to better maintain their competence. This article describes recent research to ascertain how nurses used mobile technologies to determine if these behaviours could be leveraged for mobile learning. It addresses a gap in the existing literature around how nurses resource their own professional development in the absence of appropriate resourcing in the workplace.

Methods

The research employed a classic grounded theory methodology which was conducted with 27 registered nurses from Public and Private Hospitals in Queensland and external postgraduate nursing students from Victoria, South Australia and the Northern Territory enrolled at the University of Southern Queensland.

Results

The Theory of Economising Learning describes how nurses maintain competence with limited resources. Unfavourable staffing levels and a fast-paced workplace mean that nurses rarely prioritise their professional learning while at work. Instead, it requires the nurse to contribute personal resources including time and money.

Though the research revealed that nurses were unconcerned about using mobile technologies, they were concerned about maintaining competence with limited resources. To counter this, nurses economised their learning by balancing personal resources against their motivation to maintain competence. The process of economising learning begins and ends with the development of the nurse's personal curriculum in response to what they identify as being the most significant knowledge deficits at work that jeopardise their competence. A learning opportunity that addresses the knowledge deficit is sought. Nurses balance the opportunity to address the deficit against the cost of personal resources, to decide if they will engage with the opportunity and update their personal curriculum accordingly.

Conclusions

It is suggested that workplaces need to create reasonable expectations within nurses to address knowledge deficits and provide the resources, including time, to allow them to do so without personal cost. It is also necessary for workplaces to moderate the flow of learning opportunities so as not to overwhelm and demotivate the nurses. Currently, nurses use several strategies to optimise their learning using mobile technologies which could be leveraged in the workplace.

Background

For nursing to maintain itself as a profession, it is essential to improve the profession, and the standards the profession sets for itself, using evidence-based knowledge [1]. It can be challenging for those within the profession to keep up to date with and utilise the ever-expanding range of innovative care strategies, treatment modalities, and technologies emerging in healthcare [2, 3]. The transition from a newly university-graduated nurse to an effective practitioner can often be difficult. In the university, learning and teaching may be technology-driven and innovative, usually providing good online access to support learning [4, 5, 6]. By way of contrast, the nurses' capacity to continue learning is compromised when they enter the "real world" of nursing. Many practical barriers hinder learning and the supportive environment of the university is no longer evident [7, 8]. Even so, lip-service is given to life-long learning in the profession, especially given the current and pending ageing population with their multiple and complex comorbidities [3, 9, 10].

Continuing professional development is essential in fostering a nursing workforce that is up-to-date with best practice, and able to provide quality care to patients through the implementation of new knowledge [11, 12]. As a result, nurses also need the ability to find information quickly when faced with knowledge deficits [13], and the strict requirements for continuing professional development to maintain nursing registration reflect its importance [14, 15]. The ways in which the nursing workforce continues to grow knowledge becomes a vital consideration as nurses adapt to the rapid changes in healthcare. In a climate of increasing workload pressures and staff shortages, traditional classroom teaching models fail to accommodate these emergent needs for knowledge acquisition. Staff shortages and issues with skills mixes have meant that nurses are often prevented from engaging with professional learning within normal work hours [16]. With a predicted shortage of nurses into the foreseeable future, this scenario is likely to worsen [10]. Instead, nurses are investing personal time and finances to participate in education outside of their work hours. This impacts on work-life balance, taking them away from the necessary downtime with family and friends [16, 17].

The availability of technologies to enable online learning has rapidly increased over the past decade [5, 18, 19]. The evolution and proliferation of these technologies has happened so quickly that those organisations responsible for delivering education have often struggled to embed and monitor their effectiveness [20]. What is also unclear is the end users' – in this case nurses' – preferences for using technologies for learning and teaching. The notion of a knowledgeable lecturer taking centre stage with a room full of deferential students taking notes, asking questions, and having critical debate, is becoming outdated [21]. Instead, they are seeing blended models of learning that combine face-to-face learning with online activities. Ideally, nurses' learning spaces would supersede the typical classroom of old [22, 23, 24], and make extensive use of simulations, artificial intelligence agents, and haptic technologies [25].

Learning mediated by digital technologies such as mobile phones, has the potential to improve nurses' access to education, with the added advantage of facilitating engagement when and where it is convenient [24, 26, 27]. Mobile learning has already been used in discrete projects within nursing and other healthcare professions, mostly with undergraduate learners. The documented successes indicate that it potentially provides benefits for the learner in terms of

convenience, interactivity and enhanced communication [28, 29, 30], and should be investigated for its potential to improve access to learning for registered nurses. Mobile learning can occur anywhere and anytime, maximising its potential to happen a time and place of optimal convenience to the learner [19, 29, 31]. It is rarely the sole delivery mechanism for a unit of learning, as advantages can be maximised by combining it with other forms of interaction [12, 24].

Methods

Classic grounded theory, as espoused by Barney Glaser [32, 33, 34], was the methodological framework which underpinned this research. Grounded theory was used as it gives the researcher an understanding of the pertinent issues in an area and the behaviours that are used to resolve them. Importantly, it focuses on the interests of the participants [33]. The aim was to engage with registered nurses to discern how they were using mobile technologies in their personal and work lives, with a view to leveraging those existing behaviours – if appropriate – to introduce mobile learning for continuing professional development. Grounded theory was therefore compatible with the aims of this research, especially given the focus on the issues and behaviours identified by the nurses themselves.

Twenty-seven nurses were interviewed over a six-month period, recruited from a wide variety of locations to ensure as broad a sample as possible. Interviews lasted between thirty minutes and one hour. Registered nurses from both private (thirteen) and public health services (six) were recruited from a range of locations including metropolitan (nine), regional (thirteen), rural (three) and remote (two) areas in Queensland (twenty-three), Victoria (one), South Australia (one) and the Northern Territory (one). Twenty-four female and four male participants were included in the research with a large diversity in ages and nursing experience ranging from new graduates to senior nurses with many years' experience. As the research progressed, it became evident that there was no significant difference in the data elicited from nurses residing in different states. However, there were potential variations in the data depending on the amount of time since graduation, therefore, further participants with varying times since graduation were sought to broaden the data set. Multi-site ethics approval was gained from Queensland Health and St Vincent's Hospitals (large private hospitals) within Queensland. Ethics approval was also gained from the University of Southern Queensland which enabled access to students undertaking postgraduate study at this distance-learning university.

Data collection

The data was elicited through unstructured interviews which began with a lead question regarding mobile devices and learning. In keeping with Glaser's methods for grounded theory, research interviews were detailed in field notes for later analysis, rather than being recorded [33]. Data was collected until no new concepts emerged. Unsurprisingly, the interviews revealed that most nurses were comfortable using mobile devices. Grounded theory is useful for exposing previously unknown issues and this proved to be the case in this instance. The main issue that concerned nurses was the challenge they faced trying to maintain professional competence given the limited resources available to them in the workplace.

Data analysis

Analysis was undertaken using the approach documented in Glaser [33] and Glaser & Strauss [32], whereby analysis occurs on four levels. On the first level, data was collected predominantly through unstructured interviews. The second level analysis occurred simultaneously with the first level and consisted of line-by-line coding to elicit the maximum amount of information from the data, without imposing assumptions onto it. This continued until no new properties emerged from the coding. As the research progressed, codes were compared in order to generate categories and their properties. At each stage of the analysis, further participant groups were identified for investigation (as mentioned previously with the differing times from graduation). This also led to questions being asked around the motivation for learning and the access to learning, to further investigate the main concern of the nurses which emerged from the data: "Maintaining competence with limited resources." Memoing – the act of writing reflective notes – occurred throughout the research. This raised the conceptual level of the analysis until the third level of analysis occurred, where the memos were sorted, and the resultant concepts were integrated into a substantive theory. The fourth level of analysis involved comparing the developed theory with the literature. This will be expanded upon in the discussion.

To ensure strict adherence to Glaser's approach and credibility of the research process, Dr Helen Scott of Grounded Theory Online was consulted throughout the research [35]. The investigator used a detailed memo to document her personal beliefs regarding the research area; these beliefs were then set aside so they would not colour the research findings. The product of a grounded theory is legitimised through four outcomes: "Does the theory work to explain relevant behaviour in the substantive area of the research? Does it have relevance to the people in the substantive field? Does the theory fit the substantive area? Is it readily modifiable as new data emerge?"(33). Member checking was used to verify whether the theory explained behaviour and had relevance and fit. The Theory of Economising Learning was presented orally to two groups of registered nurses within hospitals and written copies given to other registered nurses outside of the research group. In all cases, the nurses agreed that the theory explained behaviour, and had relevance and fit. Interrogation of the Theory within the broader nursing community will ultimately determine if the theory is relevant and if the theory is modifiable over time.

Results

The analysis of the data led to the development of the Theory of Economising Learning: How nurses maintain competence with limited resources. After graduation, to secure the professional learning they required, nurses needed to contribute personal resources including time, money, technology, the site of learning and prior knowledge. Nurses indicated that these resources were limited and consequently, they needed to get the best possible learning outcomes in exchange. They had to be constantly mindful that the outcomes they received justified the expenditure, hence, economising learning. The availability of these resources is different and at some level, finite for each nurse. Following is the exposition of the Theory of Economising Learning, describing the process by which nurses maintain their professional competence with finite resources.

The Theory of Economising Learning describes five stages of a necessarily continuous process as the nurse continually learns throughout their working life. The theory is represented in Figure 1.

Defining curriculum

The process starts and finishes with defining curriculum as the nurses described their awareness of the need for learning as being directly influenced by what they viewed as the knowledge needed to maintain competence in their work. Their personal curricula will ultimately be altered as their knowledge increases and new knowledge deficits are identified.

Curricula in the education sector are based on what knowledge it is expected a learner will have at graduation, adequately equipping them to undertake the occupation for which they are educated. Nurses work across many different specialties and although they will require some common knowledge and skills, what the individual identifies as important to their personally identified curriculum will differ markedly. The personal curriculum is largely influenced by what is happening in a particular ward area, as one participant stated:

I'm prompted to go to education by common themes emerging on the ward, for example renal and chest pain.

A personal curriculum evolves over time as a person becomes aware of a knowledge deficit; as one participant stated when discussing the challenges for new staff:

You don't know what you don't know.

Compared to a nurse with extensive experience, a new graduate will have only a basic understanding of what is involved in working in a specific area, and this is generally expected and accepted. As one nurse commented:

I felt like I knew nothing in the first year.

As a consequence, the next step in the process of economising learning is gaining awareness.

Gaining awareness

Nurses described becoming aware of the need to learn in order to advance their careers. In order to advance, nurses will often become aware of their need to complete more formal learning, such as acquiring a postgraduate qualification. This has been called "stepping" as nurses are stepping up to higher positions or changing career direction as a result of further learning. Examples of this would include a nurse completing postgraduate qualifications to become a Midwife or completing leadership qualifications to become a manager.

Nurses also described gaining awareness of the need for further learning when their current level of knowledge compromises their competency. This can occur when they have insufficient knowledge to address a particular situation which arises in the workplace. This has been described in the theory as "falling short" and requires the nurse to take immediate action to maintain the safety of the patient. As two nurses discussed:

I looked up policies and procedures when I wasn't sure how to do a procedure.

I go to senior staff who are really helpful telling me what I need to know.

Rather than falling short, a nurse can also be prompted to identify a knowledge deficit or aspire to broaden their curriculum to achieve a particular end.

The research uncovered that the workplace significantly influenced whether or not a nurse identified the need for learning. When those in a work area have high expectations of knowledge and the acquisition of knowledge was modelled by senior staff, the participants identified that there were increased expectations around gaining knowledge. Participants also identified that the expectations of their colleagues influenced their own expectations around their knowledge.

Participants who were in senior positions identified that their colleagues expected that they would have a high level of knowledge and this motivated them to keep learning. These nurses were often consulted by less-experienced staff and therefore needed the knowledge to be able to adequately fulfil this role. The extent of this was dependant on their formal role within the group. This idea is reflected in this note from an interview:

Learns so she has information for staff, motivated by what staff need to know and to stay current.

The degree to which the nurses had expectations of themselves was another variable to be considered. Some participants described having higher expectation of themselves than others. While some nurses stated they needed sufficient knowledge to react to and understand any situation and claimed the aspiration to continuously improve their knowledge, others identified needing only the knowledge to do their job.

Learning opportunities

Learning opportunities flow into the nurse's awareness at a variable rate, depending on the particular workplace and the opportunities that the nurse is aware of both within and outside of the organisation. Participants described how the flow of opportunities ebbed and flowed; sometimes not enough and at other times, too many. Obviously, insufficient opportunities make it more difficult for the nurse to access learning. As stated by one nurse:

> *The educator doesn't give much education.*

By way of contrast, participants stated that if they were made aware of too many opportunities or asked to undertake too much learning, they became reluctant to engage with the opportunities to improve their knowledge that they would ordinarily value.

As the learning opportunities come into the nurse's awareness, the nurse compares them to their personal curriculum and determines whether or not they will engage with the learning opportunities.

An appropriate flow of learning opportunities enables nurses to not only become aware of possibilities for learning, but allows them easier access to those opportunities. These opportunities can come in many different forms, including articles for informal self-directed learning, structured opportunities within the organisation, online resources or courses, or outside face-to-face workshops. The use of technology is invaluable in both facilitating learning opportunities for staff and in making staff aware of those opportunities. Technology facilitates access to repositories for learning materials, where a nurse is able to use a single access point to learning but is able to target the specific learning opportunities that are relevant to them. Using technology to facilitate access to a repository stops nurses being bombarded by information being displayed around the wards but still allows them quick access to opportunities. Nurses are also motivated to learn from people they trust and are more likely to access those learning opportunities recommended to them. As this nurse comments:

Online is convenient … it means I don't have to seek it out as it's there in one place.

If the learning opportunities are not made available to the nurse through the education flow within the organisation, they must seek out learning opportunities themselves. In the theory, this is called "seeking" as it is an activity that takes time and resources from the nurse. It takes time for the nurse to seek out the opportunities and insight to discern if the learning is appropriate for their needs.

Before and while a nurse is engaged in learning, they must balance their motivation for learning against the personal resources it takes to engage with that learning. This is where organisations are able to make an impact: By reducing the resources a nurse needs to input into learning or by increasing the nurse's motivation through raising expectations and optimising education flow. Nurses stated they were more likely to engage in learning if the organisation contributed to the cost and provided them with time out of work to participate.

Balancing

The nurses balanced their motivation to learn against the personal resources they had to contribute to that learning to determine how and if they would engage. The nurses also used various strategies to reduce the impact on their personal lives through moderating the amount of personal resources they needed to contribute.

Engagement with learning only occurs when a person identifies the need for learning and then allocates the required resources to undertake that learning. The value in the learning must therefore outweigh the cost of the personal resources needed to engage with it. The nurse's perceived knowledge deficit contributed to the shape of the personal curriculum and provided the motivation for learning. The greater the deficit, the more pressure they felt to bridge that gap through learning. The nurse evaluated each learning opportunity to determine if it addressed the deficit in knowledge. The availability of personal recourses was balanced against the motivational factors informed by personal beliefs, the environment, extent of the knowledge deficit, expectations of self and others, and the need to move into a different position. Finding the time for learning was described as being difficult for the nurses as usually this time came from their often busy personal lives. As one nurse states:

With a family it is very hard to find time to study

When highly motivated, nurses show incredible ingenuity for finding ways to include learning in their lives. Digital technologies are often employed to save a nurse time with learning while also maintaining the quality of that learning. The use of digital technologies depended on their availability, the nurse's access to the internet and their knowledge and comfort with using technology. As a result, each individual used the technologies differently and to varying degrees to economise the resources needed to acquire knowledge.

Nurses often use mobile applications ("apps") on their mobile phones or tablets in the workplace to enable them to access information quickly. While it was often just to check knowledge rather than to gain new knowledge, this behaviour enabled the nurse to ensure they were using best practice. They used their mobile devices to quickly check medication uses, side effects and dosages that otherwise would require them to access the information at the nurses' station which was not time efficient and at times, not possible. As this field note identifies:

She looks up things on her phone at work, medications and diseases.

Some nurses divulged that they would like to use their mobile device for this purpose, however, mobile devices were not allowed to be used within the ward. This raises safety concerns as nurses may be dispensing medications without having the knowledge they need to ensure safe use. Some new graduate nurses used apps recommended to them by the nurse educator which they found valuable. Recommending apps to staff also gave the educator some input into the information the staff were obtaining which ensured the quality of the learning.

The flexibility of digital learning enabled the nurses to target the information that is relevant to them. To increase their efficiency, the nurses sought out the knowledge they needed to learn and compared it to their current knowledge levels. Experienced nurses were more likely to undertake online learning as they are able to "skim over" what they already knew and concentrate on what they did not know. As indicated in this fieldnote:

Would rather learn online as she's sick of bad presenters and feels she has sometimes more knowledge. Can learn what she wants to learn and complete in her own time, without wasting a day of her leisure time.

This was not the case with all experienced nurses and appeared to be dependent on the availability of their personal resource of time.

Nurses often learned while multitasking. For example, nurses would listen to learning materials that had previously been downloaded to a mobile device. Podcasts can be listened to while exercising or doing household chores. Nurses multitasked when waiting for appointments or waiting to pick up children from activities. As this nurse states:

I listen to podcasts when I'm doing the housework or mowing the lawn

Similar to multitasking is catching time where the nurse takes advantage of a short period of time to concentrate on learning. It differs in that only learning happens during that period. Catching time is often at the expense of personal time, but is woven into their lives in such a way as to minimise the impact on their personal lives. The time used when catching time is usually when their families are engaged in other activities. Examples of this are when children are at after school activities or most frequently, when they are sleeping, either late at night or early in the morning. Time can also be "caught" at work during periods when they are not so busy and at the change of shift. Both multitasking and catching time require that learning is able to be undertaken in small pockets of time perhaps building to a larger piece of learning. As these nurses' state:

After the kids go to bed I can do education.

I stay back after work if my son is at after school activities.

Staying connected via social media, emails, reading journals and online groups allow nurses to undertake small amounts of learning frequently without the need to specifically search for the learning opportunity. The nurses consistently sift and sort this information and place the learning into their lives through the behaviours of multitasking, catching time and targeting.

Education flow is most available to nurses who are connected through their digital devices, using these to access learning. Nurses who are digitally connected use social media in their everyday lives. They are also nurses who stay up-to-date with their specialty by attending conferences and being members of groups related to that specialty. The more connected of these nurses have a good knowledge of what is available online and influence other nurses regarding what learning is needed in a work area. Examples were given by nurses of being made aware of learning opportunities through emails sent by other staff (often the educator or facilitator) or being part of a closed Facebook group where learning opportunities or bites of information relevant to their workplace were posted. Through staying connected, the nurse is able to undertake small amounts of learning frequently, thereby allowing them to integrate learning into their lives. As one nurse commented.

I don't have time to look for it so if it comes to me that's great … I send the emails from work to home and will access it in other places while I am waiting.

The above comment also demonstrates nurses sifting and sorting the information they received. The nurses in this research sifted the information by relating it to their personal curriculum and deciding whether or not they will undertake the learning. They then sorted the information to decide how and when they would engage with it. If it was of particular interest to them, they engaged with it immediately or they saved it for a later time. They also sorted the material to decide how they could best interact with the material and either sent it to their home computer, saved it to a mobile device, or printed the material as some preferred to have a hard copy. Making the material available digitally allowed the nurses to have choices in the way they interacted with the learning.

When balancing, a nurse sometimes needed to compromise their definition of competence. Compromising occurs when the nurse's motivation for learning is outweighed by the personal resources they need to contribute. When compromising, the nurse will not engage with a learning opportunity, therefore, balancing and engaging are dependent on each other.

Nurses engage with learning in one of three ways: 1) Learning on the run occurs when the nurse is engaged with work and the knowledge is needed and is immediately applied; 2) Pre-emptive learning, in advance of when it is needed, where the nurse has included the learning in their personal curriculum and may be in response to a previous knowledge deficit; and 3) credentialed learning that involves a formalised curriculum and results in a qualification. Learning on the run, pre-emptive learning, and credentialed learning are undertaken within the overall context of the workplace.

After the nurse has undertaken the process of economising learning, they will have a altered view of their learning needs and they will modify their personal curriculum accordingly. The process will then start again with the nurse's knowledge increasing continually and the personal curriculum being altered and refined. As discussed, the process is influenced by the workplace and occurs within the context of an organisation.

The organisation significantly influences the nurses' opportunities and engagement with learning. If the organisation has a culture of knowledge being valued and an expectation that nurses will use best practice, nurses indicated they would be more likely to undertake learning. Nurses also felt more inclined to use their personal resources if the organisation contributed to their learning, as one nurse explained:

It helps when work is supportive of education. There was pressure in another hospital I worked at to do everything in your own time. Here you are encouraged more and the atmosphere is different in the hierarchy. When people apply to go to education, they usually get it and it makes you more enthusiastic to also do some in your own time.

Access to resources within the workplace reduces the need for nurses to use their personal resources for learning. Resources include senior nurses as mentors, computers available in work areas, and time during work to undertake learning. Nurses valued senior nurses visiting them regularly during the shift and discussing patients as this education was based on the needs of their patients. One hospital had numerous computers available for staff on the ward. This meant that staff had access to them at all times, allowing them to check on things they were unsure of and to engage with learning in any downtime.

The amount of mandatory learning that a nurse needs to complete, impacts on the amount of personal resources the nurse has to allocate to learning to address knowledge deficits. Some workplaces allocated time for nurses to complete their mandatory training either by relieving them from patient care or allowing them to catch time. As this comment indicated:

I do my internet education at work. Since there has been eLearning, I am up to date with mandatory education.

If nurses received too much information about learning opportunities, it made it difficult for them to determine what was important and what was not, and they became desensitised to the requests of the organisation. Therefore, there needs to be consideration given as to how learning opportunities are communicated to staff. As this nurse stated:

Online learning is saturated here. It should be refined to only professional development, not to invade. Staff need to feel like they're getting something rather than something being asked of them.

Discussion

Limited resources

It was surprising to find in this research that nurses were not concerned about the use of mobile technologies or indeed any technology to undertake learning. This has changed in recent years where previously, nurses had expressed concern about the use of technology [36]. The aim of this research was to discover how nurses were using mobile technologies in their personal and work lives, in order to leverage their existing behaviours to implement mobile learning. It was found that nurses were often using mobile technologies or technology in general to address their main concern of maintaining competence with limited resources. As discussed in the background of this paper, nurses are attempting to undertake learning with limited personal resources. What has not previously been discussed in the literature, is how mobile technologies are able to save the nurse time and money by being available to them at times that suit their lives and by providing instant information where it is needed at the bedside. The findings of this research provide an opportunity for educators and workplaces to leverage the affordances of mobile technologies to equip the registered nurses with greater access to knowledge through flexible learning opportunities.

Motivation

This research identified the extrinsic factors that impact on nurses engaging with education, however, it was out of scope to explicitly explore nurses' motivations to do so. Instead, three theories of motivation were considered to help extrapolate and explain what these motivations might be. The three theories considered here are: 1) Self-efficacy Theory [37. 38]; 2) the Theory of Planned Behaviour [39, 40, 41, 42]; and 3) Self-Determination Theory [43, 44]. These theories were chosen as they have already been explored in the context of nursing and because of their fit with this research.

Self-efficacy Theory could explain why some nurses are hesitant to undertake education while others believe they are able to undertake and complete learning. Self-efficacy Theory supports the findings of this research that nurses are motivated to learn when they fall short. This is described by Self-efficacy Theory as a person being dissatisfied until their own standards are met [38]. It then becomes crucial to understand what impacts on an individual's standards, and, as this research has proposed, a person's standards can be heightened when there are high expectations in the workplace.

A person's belief that they can be successful in an activity is dependent on their successes and failures of the past, and can be influenced by the vicarious experiences of others undertaking learning in their workplaces. Nurses undertaking learning, raise the expectations around learning of others within the workplace. Self-efficacy Theory may also explain why some nurses are more persistent than others and overcome more obstacles in order to engage with education.

The Theory of Planned Behaviour aims to explain human behaviour rather than just predict it [39] This is explored through behavioural beliefs, normative beliefs and control beliefs and is linked to Self-efficacy Theory. This theory would explain how nurses weigh up the possible outcomes of the learning against the cost of undertaking it. In the Theory of Planned Behaviour the motivation for these actions would be ascribed to behavioural beliefs [39, 40].

Normative beliefs relate to the perceived social pressures to perform an activity [40]. This is seen in the Theory of Economising Learning when the nurse undertakes learning because of the expectations that they will have a certain level of knowledge in their position.

Control beliefs arise from the difficulties the person perceives they will have in undertaking an activity, and similar to the Theory of Economising Learning, will relate to time, money, skills and the co-operation of others. In the Theory of Economising learning, the nurse considers if they have the resources needed to undertake the learning or if they can sufficiently manipulate the resources to undertake the learning.

Self-determination Theory explores the interplay between intrinsic and extrinsic motivation, and the basic psychological needs of competence, autonomy, and relatedness [43]. This theory can be seen in the Theory of Economising Learning in a number of ways.

It was identified in this research that nurses develop their own curriculum corresponding to what they see as being important knowledge in their work environment. This is impacted by extrinsic factors such as the expectations of others. It is also impacted intrinsically by their passion for the topics they are learning about and their personal search for knowledge.

Nurses can lose motivation when the organisation does not explicitly support them gaining competence, blocks their autonomy or hinders their notions of relatedness to their peers and the workplace. This is particularly evident when the learning is unreasonably mandated by the organisation, with burdensome requirements for participation. The individual will have few resources to allocate to their personal curriculum and little autonomy, reducing their motivation to engage with the learning.

These three theories are consistent with and support the findings informing the Theory of Economising Learning in relation to the development of nurses' personal curricula, awareness of the need for learning, and balancing the need for learning against its cost. They also explain the differences in motivation and persistence in learning between different groups of nurses. The three theories therefore add support to the validity of the Theory of Economising Learning.

Nursing academic, Patricia Benner posited the Theory of Novice to Expert which was also reflected in this research [45], explaining the differing needs of nurses for expertise beyond their own in the area in which they work. The impact of experience on learning needs and how a person learns ensures that each learner will bring a unique set of experiences and expectations to every situation [46, 47, 48]. This research augments Benner's theory by recognising that nurses' movement between being novice and expert is fluid, depending on the particular situation, because of each nurse's unique combination of knowledge and experience. Hence, in this research, knowledge is identified as one of the resources the nurse brings to their engagement with learning.

Many of the nurses in this research were innovative in their use of mobile technologies to support their own learning. They enabled learning through using the techniques identified as multitasking, catching time, and staying connected. This is consistent with the wider literature where it is acknowledged that technologies have changed the learning landscape, allowing learning to occur outside of traditional classrooms and other physical spaces. The landscape continues to evolve at a rapid rate due to the emergence of new technologies and the corresponding changing patterns of use in relation to learning [49, 50].

Conclusion

Though the original focus of this research was to discover how nurses used mobile technologies in their personal and professional lives, it also unearthed the processes by which nurses ensured their own competency through addressing knowledge deficits. Though their preference was to meet their continuing professional development needs during work hours, they found there were often limited resources to do so. Invested in maintaining their own competence, nurses developed a range of strategies to ensure that the learning continued, often investing their own resources including time and money. This article addresses a gap in the literature, exploring how nurses resource their own professional development, in order to maintain competence, sometimes in the absence of appropriate resourcing to do so in the workplace.

This article has described the generation of the Theory of Economising Learning to explain the continuous process by which nurses access and undertake learning, and where and how they do so. The process of economising learning is undertaken within the context of an organisation and involves defining a personal curriculum, gaining awareness of knowledge deficits, identifying learning opportunities, balancing opportunity with resource cost, and finally, engaging with learning. What is most significant is understanding how nurses ensure their competence using the limited resources available to them. Digital technologies are useful in this process as they are available to use in any location and at any time with nurses already owning devices and being familiar with their use. The use of online learning more generally is also valuable in that it facilitates learning without the need to travel to a campus or other physical location, while still enabling the nurse to choose something that is relevant to their own particular needs.

This substantiative grounded theory, the Theory of Economising Learning, can only be applied to the area where the research was conducted. This research is therefore only applicable to registered nurses within Australia. It is possible, and perhaps even probable, that the Theory of Economising Learning could explain the learning behaviours of nurses in other countries or be applicable to other professions, however, theoretical sampling of those wider groups would need to occur to confirm emergent fit. Even so, there is much to be gained by incorporating the learnings of this research when planning for continuing professional development for nurses in the context in which the research took place.

Maintaining the competence of nurses in the workplace through continuing professional development is more likely to be successful if certain strategies are adopted. This research posits that workplaces need to create reasonable expectations within nurses to address knowledge deficits and provide the resources, including time, to allow them to do so without significant personal cost. It is also necessary for workplaces to moderate the flow of learning opportunities so as not to overwhelm and demotivate the nurses. Currently, nurses use several strategies to optimise their learning using mobile technologies. These could be leveraged in the workplace to help nurses maintain professional competence.

With health care settings encountering a range of emerging challenges such as with the COVID-19 pandemic, the need for the health workforce to be agile in terms of knowledge, has never been greater. Careful planning around the delivery of that learning, including the resourcing of it, means of delivery and creating the expectation of engagement is necessary to ensure its success.

Limitations

This study has been conducted with postgraduate nurses within Australia, it is therefore not known if the theory could be generalised across the rest of the world and to other professions. The broader literature in nursing, however, is consistent with the findings of this study and it is therefore likely that the findings will be applicable outside the group studied. Further research would need to be conducted to determine if the findings could be generalised outside of the nursing profession, as it not known if other professions face the same issues in regard to professional development.

Care was taken within this research to ensure that a wide variety of nurses were interviewed, and that nurses of all levels of comfort with technology were recruited. It is possible however, that those that self-selected to participate in the research were those nurses that display driven behaviours toward learning and also those that are more interested in using mobile devices.

Abbreviations

Mobile applications (apps)

Declarations

Ethics approval and consent to participate

Written informed consent was obtained from participants prior to interviews.

Ethics approval was sought and gained from:

The University of Southern Queensland, Approval Number: H13REA054

Metro North Hospital and Health Service, Approval Number: HREC/13/QPCH/144

St. Vincent's Health and Aged Care: Approval Number HREC#13/05

Consent for publication Nor Applicable

Availability of data and materials

Data collected for this research is not publically available as it could compromise participants or the organisation where they are employed.

Competing interests Not Applicable

Funding Not Applicable

Authors' contributions

This research was conducted as part of PhD studies and therefore data collection and analysis were conducted by SR supervised by HF and CM. All authors have contributed to this article and have approved the final version.

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Figures

Figure 1

A graphical representation illustrating the stages of economising learning for nurses

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