ORIGINAL RESEARCH

The effect of mLearning on motivation in the Continuing Professional Development of nursing professionals: A Self-Determination Theory perspective

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ABSTRACT

Mobile learning (mLearning) has gained popularity in recent years, particularly in the clinical setting. mLearning reduces the theory-practice gap by providing relevant information to nurses and boosting clinical skills. Despite the vast majority of work in this area, few studies in nursing have investigated the correlation between motivation and mLearning for continuing practice development (CPD). Motivation is an essential theoretical concept used to explain human motive that is not new in nursing. Understanding the notion of motivation directed towards learning may clarify the role of technology within pedagogy. Additionally, associating motivation and self-determination may be crucial in understanding motivation in professional nursing practice and education. This study determines the effect of mLearning on motivation to enhance CPD in nursing professionals (NP) analysed critically through a Self-Determination Theory lens. Twenty-three qualified nurses working within the clinical area participated by using a specific mobile application on their smartphone to learn nursing related skills. Over three weeks, participants logged in their learning experience, providing an overview of the relationship between motivation and mLearning. The nurses participating in the study found mLearning motivational in the clinical setting and indicated ownership of their learning, suggesting perceived autonomy. Furthermore, the mobile application enhanced nursing practices through gaining competency and fostered team building through interactions with other health professionals in the clinical area, demonstrating relatedness. This work suggests that having ownership of the learning experience fosters motivation through intrinsic and external needs, supporting learning and gaining competency in the clinical area. Also, the need to become competent and share with others further nurtures motivation to learn in the clinical area. Additionally, these findings suggest mLearning features that motivate NP towards clinical development. This study concludes with implications for the scholarship on mLearning for the continual practice development of nurses.

Key Words: CPD, Nurses, mlearning, Mobile apps, Motivation, Ethnography

1. INTRODUCTION

The clinical area is a dynamic setting that fosters learning[1,2] even after nursing professionals (NP) have completed their initial training. Continuing professional development (CPD) in nursing is critical to remain knowledgeable and carry out the nursing role safely and effectively by having access to

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best practices.[3] As NP need to make confident and competent decisions to provide safe and quality care to patients,[4] CPD is essential to meet professional learners needs.[5] Admittedly, mobile devices have become a normalised practice to enhance learning and job referencing[6] to continue professional development.[5]

As growing research explores learning beyond the classroom, mLearning is on the rise[7] owing to user independence,[8] flexibility, availability and enhancing motivation to learn.[8–10] In fast-paced settings, such as the clinical area, choosing suitable learning strategies to implement adult education is essential for the acceptance of self-directed CPD.[5]

Mobile devices are tools utilised for communication and information sharing; however, the literature suggests that such technologies have infiltrated the educational domain.[11] Considering mobile devices are small, portable, and single-user technologies,[12] one can understand this prevalence in education. One feature that elevates the smartphone is that various applications can be downloadable through its operating system.[11]

Mobile applications, hereafter referred to as apps, are smartphone or tablet designed software programs that are usually available to download across app distribution platforms.[13] Medical apps can provide learning opportunities to NP aiding inpatient management, clinical decisions, reference to medication dose/interactions,[14] and professional development[13] on a vast range of specialisations.

Passey[15] defines learning as understanding formerly unknown concepts that are best understood when the content is comprehended as context, presenting meaning to the learner, as described in situated cognition. Moreover, when digital technologies are incorporated into learning, the choice becomes an influential factor,[15] emphasising how choice correlates to learning motivation.[16] As technology evolves and infiltrates the educational process, the learning process undoubtedly transforms,[17] suggesting that educators need to focus on how learning is influenced when using technology.

The research methodology ethnography is applied to the current study to understand further the effect of mLearning on motivation towards learning by using an app in the clinical area. Observing nurses using mLearning to enhance CPD shall be explored through the social psychology of Self-Determination Theory (SDT) as a theoretical framework. SDT has been employed to drive this study as the basic psychological need satisfaction, essential for human functioning, as it is understood to be the primary process that focuses human behaviour through motivation.[18]

Mobile devices have proved to be a valuable learning tool for NP;[19] however, research into the motivation of CPD using mobile apps is under-researched in nurses. Despite the flood of articles focusing on mLearning in nursing students, there appears to be a gap in the literature focusing on the qualified nurse; specifically, no literature is available investigating the use of apps for CPD motivation at the time of writing. mLearning using apps have been studied to assess applicability in the clinical area;[20] however, this study implies reviewing CPD policies and practices to facilitate effective adoption of such technologies in supporting CPD.

Therefore, this study offers a new outlook to knowledge on the effects of mLearning on motivation in CPD for nurses within the clinical area through an SDT lens. This study observes nurses using apps in the clinical area to understand whether mLearning is motivational to continuous development. The theoretical framework applied to analyse the data shall be based on SDT to explore motivation towards learning using mobile medical apps. The following research question (RQ) was proposed to gain an in-depth understanding of the experience:

RQ1-How do nurses perceive mLearning to influence their motivation for CPD?

Coming from a background in health, the author recognises the challenging problem involving learning strategies to motivate adult education to enhance knowledge, skills and clinical performance, thus emphasising the need to investigate how mLearning may exhibit motivation towards CPD.

2. METHODOLOGY

2.1 Research methods

For this study, an ethnography approach was used to understand a description of the learning experience by nurses using apps in the clinical setting to assess their effectiveness to motivate learning. Ethnography was chosen as a research method to explore and observe how mobile apps can foster motivation to learn in the clinical area from an individual viewpoint, which the researcher can understand as an insider perspective coming from this domain. Ethnography delivers an added value to the research through observing participants point of view. This methodology allows an understanding of the meaning behind their behaviours and thought processes.[21] The epistemological basis of the methodological approach was attempted as it can divulge a deep understanding of how and why[22] learning in the clinical area can occur by using apps to motivate learning through observing participant record entries in a log producing a deep and more precise picture of this professional group. Collecting NP experiences are essential to critically analyse their experience with apps leading to learning within the clinical area and

their motivation.

2.2 Research design

As the study aimed to use digital technology as a medium to observe motivation towards CPD; the study was designed for participant recruitment and observation to occur via digital means.

The study aimed to observe motivation in nurses working within the clinical area through a website created specifically for the study, where participants could input their entry logs. This purposive sample was selected with criteria including qualified nurses currently working within the government and private clinical area.

Nurses were approached through the social media platform, Facebook, using an active recruitment method to inform possible participants of the study and participant recruitment according to the inclusion criteria provided in table 1. This recruitment method was chosen due to the nature of the study, and using social media for recruitment has been proven an essential tool by scholars.[23–25] As this recruitment method may pose a risk to bias, an introduction online meeting was held for interested candidates to further describe the study's aim, explain the participant's role and present the mobile app. Such meetings occurred on two dates to facilitate the nurse's schedule, where sixteen nurses attended the first meeting and fifteen attended the second meeting. Those willing to participate emailed the researcher using their official work email to verify their work status and to show their consent. Demographic data were also collected from the participant's email and stored separately on an excel sheet on the researcher personal laptop in a password-protected file.

Each participant was allocated a number and password to use to enter the website and input their data. The website held a logical layout for participants to enter data logs in a user-friendly format. Cues were included on the top of the data log to give participants a meaningful order and format to their inputs. The website also included the link to the specific app, My Mastery NCLEX & Nursing by Higher Learning Technologies Inc. This app was chosen based on user needs, hence having a vast literacy in clinical fields and reliability and credibility. The app was ensured to be available free for downloading from the two major app stores, Apple App Store and Google Play, to ensure participant practicality.

Furthermore, the app selection criteria included that the app was written in English and had more than 1000 downloads with a minimum of 4.5-star rating. The app can be downloaded for iPhone at `https://apps.apple.com/us/app/my-mastery-nclex-nursing/id625614526` and Android at `https://play.google.com/store/apps/details?id=hlt.nursing.com&hl=en&gl=US`. Although the app is free for downloading, an extended version is possible against a payment. All participants were asked to use the free version.

Before the initial testing began, the app and website were piloted with two nurses to ensure the validity and reliability of the cues. After the pilot study, the prompters were updated based on the nurse's responses and issues to fit the RQ best.

Table 1. Inclusion & Exclusion Criteria

Inclusion	Exclusion
Qualified nurses	Student nurses; other health practitioners
Nurses working in the clinical area	Inactive nurses
Logging in five or more experience	Logging in less than five reflective experience
In possession of a smartphone	Does not own a smartphone device
Nurses addressing motivation to learn using the mobile apps	Nurses addressing motivation to learn using any other method
Both female and male nurses	

2.3 Data collection

Participant logging took place over three weeks, giving time to implement the app and reflect on their clinical routine, increasing the probability of response rate. Thirty-one nurses responded to the initial call; however, twenty-three completed the entire process.

This study addresses the effects of mLearning on motivation towards professional development, the researcher opted for an in-depth analysis of participant entry logs describing their experience with the app during clinical work over three weeks, over a minimum of five entry logs. The theoretical framework chosen, SDT can help examine the relationship between motivation for professional development and usability of apps (mLearning). The final revised cues, shown in Table 2, were created to understand participants motivation to professional development through their clinical experience. These were designed with motivation and the clinical role in mind from an insiders perspective.

Table 2. Study prompters

Prompters for participants
Give examples of how you used the app (patient bedside/break/home)
How helpful was the app to learn with reference to clinical learning?
How much do you feel you learnt using the app?
Do you feel motivated to learn by having such an app available?
In what way was the experience motivating with regards to learning?

2.4 Ethical issues and validity

Before the commencement of the research, ethical approval was obtained from the University of Lancaster, ethics review board. This study was designed carefully to protect the integrity of human subjects involved by retaining the anonymity and confidentiality of participants. Moreover, only the author had access to the recorded data logs that were password-protected and discarded after the study period. All participants were informed that the study was voluntary and that they had the right to withdraw at any time without giving any valid reason.

To ensure that the participant's entry logs demonstrated the intent of use, a pilot study was performed, using the intended prompters to seek any adjustments needed of the tool beforehand. The pilot study ran for one week using two nurses. After commencement, the researcher analysed the prompters to observe the tool's weaknesses, addressing the answers that managed to reflect the study's intent. The participants in the pilot study, being also health educators and familiar with qualitative data collection methods were asked for feedback on the prompts and the app to gain a better insight into the effectiveness of such questions.

The Health on the Net Foundation (HON) code of conduct survey allowed the researcher to ensure the validity of the app by using the system's criteria to confirm the trustworthiness of the app by measuring eight criteria, including advertising policy, attribution, authoritativeness, complementarity, criteria financial disclosure, including justifiability, privacy and transparency.[26] The app included all authorised information, including the web site's purpose, a privacy policy, modification dates, justification of claims, contact details, and an advertising policy. The website did not show any participant names, only numbers, and no data was stored on the website. All participant data was destroyed after the initial analyses process.

2.5 Methods for data analysis

The data logs' verbatim was inputted in a qualitative software, NVivo 12-Plus, a computer-assisted data analysis software (CAQDAS), created by QSR International (Melbourne, Australia) to classify group-specific codebooks emerging from the data collected. A second researcher, knowledgeable in qualitative methodologies, was invited to validate the analysis by blindly interpreting the data and comparing the analysis, pattern matching, where amendments were made to satisfy both parties.

Findings emerged in iterative patterns by the comparisons found in the discourse creating identified relevant information into nodes. By further analysing data in a data-driven manner, rather than in a structured method, categories emerged from the logical and coherent practicable portions collected from distributing similarities into manageable headings according to grouped concepts. Themes presented in the finding chapter show definitive experiences to emphasise the motivation towards learning. Representative quotes were included in the finding and later debated in the discussion chapter by referring to the rich data sets and implementing self-determination theory to emerge the purpose of motivation and how this relates to clinical learning.

3. RESULTS

The study used qualitative techniques to explore the effects of mLearning to understand the nature of motivation towards clinical learning in NP using mobile apps. From the thirty-one nurses attending the online meeting, twenty-three (n = 23) completed the complete phase (response rate of 74.2%). Demographic data collected shows that the male to female split was 34.8% (n = 8/23) and 65.2% (n = 15/23), respectively. Age ranged from 26 to 55 years old, with a mean of 33.6. Furthermore, years in nursing service ranged from 2 to 25 years, with a mean of 14.1 years.

The findings indicate that the nurses participating in the study experienced a positive learning journey. The mobile app motivated learning to enhance their competence and general clinical practice, linked to intrinsic and external factors. In addition, nurses perceived the app to offer autonomy in learning and granted relatedness to colleagues and other health professionals. Furthermore, features that motivate NP to use mLearning was also explored. Constructed through the data-led analysis, four themes emerged; Positive learning experience; Workplace learning; Intrinsic and external motivation to learn and mLearning features for motivation.

3.1 Theme 1: Positive learning experience

The learning experience was evaluated as to whether participants found the experience fruitful to learn. mLearning, by utilising the app to access training material, unanimously proved to be a positive learning experience for participating NP. Participants expressed satisfaction and an overall optimistic experience using an app to learn rather than the traditional means; moreover, the present data provide con-

vincing evidence of sharing (relatability) and collaborative learning between HP that further enhanced the learning journey.

"The app definitely helped me feel more motivated and acknowledge that there are areas in nursing care that always require further learning"- P14

"I recommended this app to other health care professionals and students to help us work towards an interdisciplinary approach, which instigated shared discussions of clinical skills and further clinical research"- P13

3.2 Theme 2: Workplace learning

The workplace was identified as a significant place to learn to relate the activity or theory to clinical practice. Workplace learning was shown to be a pivotal component to motivate NP to use mLearning in the clinical area as a point of reference, such as at the patient's bedside. Participants discussed in favour of learning at the workplace to boost competence in clinical skills by enhancing their theoretical and practical skills in the actual clinical setting, when needed most, which was also shown to create a peace of mind and perception of patient safety.

"During the COVID pandemic, we had frequent changes in the ITU, and the app was very useful as it helped me understand a ventilation setting that I was not familiar with, making me feel safer knowing I could refer to the app"- P11

3.3 Theme 3: Intrinsic and external motivation to learn

Motivation to learn was analysed separately as to whether motivation stemmed from an innate or an external root. Intrinsic motivation to learn was evident in NP, of the extent to which participants were motivated to direct their self-determined behaviour towards mLearning as to accomplish the feeling of self-competency and self-sufficiency (autonomy). The results show a strong association towards motivation to learn to feel relevant in an ever-changing clinical area and abreast of new knowledge even if NP will not use such skills/knowledge in their immediate area of work. The results also indicated that conducting quizzes created a competitive behaviour instigating intrinsic motivation. A less common finding suggested by less than half of the participants was that mLearning was conducted for pure pleasure or diminished boredom in their free time.

"I found it quite interesting to look up other skills practised in different clinical areas (such as dressing techniques used in Burns Unit). The quizzes, especially, were motivating as they challenged me to see my understanding of each topic covered." – P26

External motivation for learning was observed for competence and self-determination for opportunities within the NP career. Participants felt they were needed to strengthen their clinical practice and knowledge to carry out their role effectively and be able to mentor students and new graduate recruits.

"Watching a video about abscess incision and drainage enables confidence in the skill that I have previously encountered at work place"- P3

"The app was used today to teach nursing students about sepsis. We engaged in a discussion and learnt aspects of pathology and nursing care related. I learnt about the microbiological details related to sepsis beforehand which helped me discuss the aspect with students" – P32

3.4 mLearning features for motivation

mLearning using an app showed certain appealing features that inclined NP self-determination to learn. An interesting side finding was how the app's interface, similar to those found in social media, created a sense of pleasure to explore the app and seek opportunities to learn. The mobile app features, including having easy access and a user-friendly interface, were shown to facilitate usability while having videos to demonstrate skills and a diverse range of research topics that are clear and well explained motivated learning.

Participants stated a preference for mLearning compared to traditional methods for the autonomy fostered and real-time applicability. Moreover, the results yielded that trustworthiness of the mLearning tool is a crucial component for motivation. Participants described how accurate information was critical to trust the source and on the information to adopt clinical skills.

"What enhances me to use the app is the fact that I do not have to search for skills on media such as YouTube. Knowing that the app is trustworthy and created for nurses allows me to base my care on evidence practice"- P1

"The videos demonstrating each skill are stimulating and helped me to better understand and replicate"- P15

4. Discussion

This study attempts to establish the connection between mLearning and motivation in NP to explore the impact of mLearning on motivation for CPD. The results yielded interesting findings supporting a link between motivation and mLearning for CPD. The data provided evidence of a positive learning journey and suggested how mLearning motivated competence and clinical practice enhancement, linked to intrinsic and external motivational factors that hold theoretical support. Moreover, the data provide preliminary evidence to suggest mLearning features for future studies to investigate

to further our understanding of mLearning and motivation.

Taken altogether, the data presented in the preceding chapter provides evidence to respond to the RQ this study set out to answer. This study will further examine its contribution by reflecting on the literature gaps and discussing the emerging data.

4.1 Nurses perceptions on mLearning

Few attempts have been made to investigate NP perceptions towards mLearning in the clinical field; however, those who did[19,27,28] claim an improved view of mLearning through self-perceived improvements to learn. Through an SDT lens, this study examines the basic psychological needs to address the nurses' positive perception of learning that suggested relatedness to others. The mobile app brought HP together to learn and created a shared experience while still owning the learning situation. The positive learning experience created connections with others that proved effective in learning.[19] Deci & Ryan[18] argue in favour of the psychological need for relatedness at the workplace that, according to SDT, plays a crucial role in inherent social tasks such as learning. The current findings build on Kabanda & Rother[14] and Vallerand,[29] indicating how the learner gains motivation to learn relating with others and learning within an area that fosters learning. The inference from this is that relatedness may extend competence in the nursing role and broaden nursing career options. Vallerand[29] hypothesised the value of relatedness towards motivation as value transmission. Here the author suggests that relatedness may play an important role to transmit values to others, increasing the tendency towards evidence-based practice in nursing.[14]

Moreover, gaining competence and skills that foster their role, however, also boosts their morale was an essential feature of mLearning. As other studies had not utilised theoretical support for their work, this study sheds light on a different literature viewpoint.

The findings also indicated that using the mobile app created a perceived sense of safety, highlighting how the users enabled learning processes in the clinical practice to reduce clinical errors and access information promptly, supporting the finding by previous scholars.[19,30,31] Although much research has focused on using mLearning in NP, the notion of motivation was lacking.

4.2 mLearning and motivation for CPD

mLearning and motivation for CPD is an important area of enquiry; however, little is known about this area as less attention has been paid to link motivation and mLearning for professional development. Many studies[32–34] have addressed the need for motivation for CPD, while the current findings support the necessity of motivation to continue learning; however, the key findings suggest that mLearning is a component that instigates motivation towards CPD. Thus, the findings suggest that choosing mLearning for CPD in NP can motivate learning within the clinical area.

Motivation to learn was evident, and the findings suggest that motivation to gain competency could also be linked to an internal need and competence satisfaction played a role in the positive learning experience, as they fostered knowledge for self-perception, in turn, however, shaped their skills for better performance, as discussed by other scholars.[35]

This study signifies that integrating technology in the clinical area, specifically a mobile app, motivates clinical learning driven mainly by intrinsic motivation compelled through perceptions of self-sufficiency (autonomy) through ownership. The need for autonomy signifies psychological freedom and desire for independence in task engagement[35] and self-regulation, which could influence determination and ambition.[18] In addition, relative influences play an essential role in enhancing self-determination capability.[36] Autonomous motivation has been shown to relate to wellbeing and enhanced workplace performance.[37]

In contrast, external motivation was observed when the motivation to learn was driven by the need to learn to fulfil their mentoring tasks. In situations where learning may occur to fulfil work duties and support others, such as students, innate needs, including competence and relatedness, may be achieved; however, autonomy may be hindered.[18] Therefore, it is clear that this study proves to have sovereignty and ownership in learning, leading to gained competency predict self-determined motivation.

The results show that participants were motivated to learn to achieve feelings of effectiveness in their clinical role, indicating a need to experience competence in nursing practice. Competencies in nursing education are of utmost importance in making a suitable clinical practice judgment.[38]

By addressing the user needs identified by the participants, mobile apps intended for clinical learning may lead to better usability and acceptance.[30] Considering Vygotsky's (1978) social perspective, as cited in Passey,[15] active learning occurs through interactions and integration, keeping the learner engaged. This suggests that digital technologies can mediate and support learning by creating inclusive opportunities[15] within the clinical setting. The main problem here is that nurse involvement in the app conceptualisation, implementation, and evaluation is still lacking.[39]

The study results indicated that participants are inclined to continue to use the app for learning in the interest of

autonomous learning and the need for skill competence. According to SDT, human beings are drawn to situations where need satisfaction is present; however, humans do not necessarily need to face a need deficit to instigate actions. Moreover, fulfilling needs more likely generates the sense to need further fulfilling activities.[18] Such motivation and self-determination can benefit nurse practitioners in the clinical role to expand and update the latest clinical guidelines and evidence. Still, a challenging problem with apps for clinical learning, as observed by the current nursing participants, and correlates with the literature[13,30] is the issue of app trustworthiness. NP seek verified apps that provide authentic information[40] that can be assured when downloading apps that are compliant with the Medicines and Health products Regulatory Agency (MHRA)[27] or the US Food and Drug Administration (FDA) safety regulations.[41]

Secondly, incurred costs of the app can be discouraging; thus, a solution to both challenges could imply the health organisation could recommend an app/s to health practitioners[40] and cover the cost to buy such app/s.[31]

The author recognised limitations of this study, including that the extended version of the app would have proved best to have unrestricted access; however, this was not an option due to cost. The author contacted two verified medical app companies to provide free accounts as part of this study; however, no response was given to such a request. Secondly, the study is likely to response bias, as nurses not on social media and not technology inclined would be less likely to participate in this study. All those engaged in clinical learning ought to become aware of mobile apps' potential to foster learning in the clinical environment as technology further develops.

5. Conclusion

The current research on mLearning does not provide crucial contextual information regarding its link to motivation. Thus, this study attempted to examine the connection between mLearning and motivation in NP to explore the impact of mLearning on CPD through an SDT lens, as this area deserves more research attention.

The data provided preliminary evidence and theoretical support that mLearning can create a positive learning experience for NP by achieving autonomy, competence, and satisfaction while experiencing a collaborative learning experience. The mobile app demonstrated motivation for CPD through a strong association of ownership of the learning experience and against the hypothesis that intrinsic and external needs were met.

The data suggests intrinsic motivation to be linked to self-determination including feelings of self-competence and self-sufficiency, while external needs are directed towards the action of improved clinical skill performance and fulfilling mentoring role duties. Moreover, the findings suggest that certain mobile app features demonstrate motivation for learning. Such features identified in this study include: user-friendly interface, easy accessibility, trustworthiness, videos illustrating skills and a diverse topic range.

The findings of this study show a positive correlation between mLearning and motivation for CPD in clinical learning. Such findings base implications for practice development and hospital policymakers to review CPD training and consider the motivational advantages mLearning offers. In light of the findings, the author would encourage ensuring the trustworthiness of apps implemented through authenticity details. Furthermore, hospital management could recommend trustworthy mobile apps that can help health practitioners make safe clinical decisions. As most clinical apps require a subscription, nurses could use work resources funds as compensation.

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Conflicts of Interest Disclosure

The author declares no competing interests.

References

[1] Flott EA, Linden L. The clinical learning environment in nursing education: a concept analysis. Journal of Advanced Nursing. 2016 Mar; 72(3): 501-13. PMid:26648579 https://doi.org/10.1111/jan.12861

[2] Pitkänen S, Kääriäinen M, Oikarainen A, et al. Healthcare students' evaluation of the clinical learning environment and supervision–a cross-sectional study. Nurse Education Today. 2018 Mar 1; 62: 143-9. PMid:29353088 https://doi.org/10.1016/j.nedt.2018.01.005

[3] Hummerston G, editor. The importance of CPD in nursing. https://doi.org/10.12968/bjca.2014.9.3.109

[4] Forber J, DiGiacomo M, Davidson P, et al. The context, influences and challenges for undergraduate nurse clinical education: Continuing the dialogue. Nurse Education Today. 2015 Nov 1; 35(11): 1114-8. PMid:26264968 https://doi.org/10.1016/j.nedt.2015.07.006

[5] Scott KM, Nerminathan A, Alexander S, et al. Using mobile devices for learning in clinical settings: A mixed-methods study of medical student, physician and patient perspectives. British Journal of Educational Technology. 2017 Jan; 48(1): 176-90. https://doi.org/10.1111/bjet.12352

[6] Curran V, Fleet L, Simmons K, et al. Adoption and use of mobile learning in continuing professional development by health and human services professionals. Journal of Continuing Education in the Health Professions. 2019 Apr 1; 39(2): 76-85. PMid:30908401 https://doi.org/10.1097/CEH.0000000000000243

[7] Sarrab M, Elgamel L, Aldabbas H. Mobile learning (mLearning) and educational environments. International Journal of Distributed and Parallel Systems. 2012 Jul 1; 3(4): 31. https://doi.org/10.5121/ijdps.2012.3404

[8] Razzaque A. MLearning Improves Knowledge Sharing Over e-Learning Platforms to Build Higher Education Students' Social Capital. SAGE Open. 2020 May; 10(2): 2158244020926575. https://doi.org/10.1177/2158244020926575

[9] Alioon Y, Delialioğlu Ö. The effect of authentic m-learning activities on student engagement and motivation. British Journal of Educational Technology. 2019; 50(2): 655-668. https://doi.org/10.1111/bjet.12559

[10] Jeno LM, Adachi PJ, Grytnes JA, et al. The effects of m-learning on motivation, achievement and wellbeing: A Self-Determination Theory approach. British Journal of Educational Technology. 2019 Mar; 50(2): 669-83. https://doi.org/10.1111/bjet.12657

[11] Jebraeily M, Fazlollahi ZZ, Rahimi B. The most common smartphone applications used by medical students and barriers of using them. Acta Informatica Medica. 2017 Dec; 25(4): 232. PMid:29284911 https://doi.org/10.5455/aim.2017.25.232-235

[12] Doyle-Lindrud S. Mobile health technology and the use of health-related mobile applications. Clinical Journal of Oncology Nursing. 2014 Dec 1; 18(6). PMid:25427697 https://doi.org/10.1188/14.CJON.634-636

[13] Doyle-Lindrud S. Mobile health technology and the use of health-related mobile applications. Clinical Journal of Oncology Nursing. 2014 Dec 1; 18(6). PMid:25427697 https://doi.org/10.1188/14.CJON.634-636

[14] Kabanda S, Rother HA. Evaluating a South African mobile application for healthcare professionals to improve diagnosis and notification of pesticide poisonings. BMC Medical Informatics and Decision Making. 2019 Dec; 19(1): 1-3. PMid:30857525 https://doi.org/10.1186/s12911-019-0791-2

[15] Passey D. Inclusive technology enhanced learning: Overcoming cognitive, physical, emotional, and geographic challenges. Routledge; 2013 Oct 30.

[16] Tian L, Wu Y. Classroom choice-making for Chinese master's students: choice, motivation and learning contexts. Teaching in Higher Education. 2019 Oct 3; 24(7): 850-79. https://doi.org/10.1080/13562517.2018.1515194

[17] Mishra P, Koehler MJ. Technological pedagogical content knowledge: A framework for teacher knowledge. Teachers College Record. 2006 Jun; 108(6): 1017-54. https://doi.org/10.1111/j.1467-9620.2006.00684.x

[18] Deci EL, Ryan RM. Self-determination theory. https://doi.org/10.4135/9781446249215.n21

[19] Wallace S, Clark M, White J. 'It's on my iPhone': attitudes to the use of mobile computing devices in medical education, a mixed-methods study. BMJ Open. 2012 Jan 1; 2(4). PMid:22923627 https://doi.org/10.1136/bmjopen-2012-001099

[20] Masic I, Begic E. Mobile Clinical Decision Support Systems in Our Hands-Great Potential but also a Concern. InICIMTH. 2016 Jan 1; 63-66).

[21] Gobo G, Marciniak LT. Ethnography. Qualitative research. 2011; 3(15-34).

[22] Mannik L, McGarry K, editors. Practicing ethnography: A student guide to method and methodology. University of Toronto Press; 2017 Nov 20.

[23] Akard TF, Wray S, Gilmer M. Facebook ads recruit parents of children with cancer for an online survey of web-based research preferences. Cancer Nursing. 2015 Mar; 38(2): 155. PMid:24945264 https://doi.org/10.1097/NCC.0000000000000146

[24] Frandsen M, Walters J, Ferguson SG. Exploring the viability of using online social media advertising as a recruitment method for smoking cessation clinical trials. Nicotine & Tobacco Research. 2014 Feb 1; 16(2): 247-51. PMid:24127266 https://doi.org/10.1093/ntr/ntt157

[25] Shere M, Zhao XY, Koren G. The role of social media in recruiting for clinical trials in pregnancy. PloS one. 2014 Mar 26; 9(3): e92744. PMid:24671210 https://doi.org/10.1371/journal.pone.0092744

[26] HONcode: Guidelines [Internet]: Operational definition of the HONcode principles. Hon.ch. (2021). [cited 2021 March 31]. Available from: https://www.hon.ch/en/guidelines-honcode.html

[27] Carter TH, Jais A, Rodrigues MA, et al. Smartphone and medical applications use by contemporary surgical trainees: A national questionnaire study. Journal of Mobile Technology in Medicine. 2014 Jul 28; 3(2): 2-10. https://doi.org/10.7309/jmtm.3.2.2

[28] Li KC, Lee LY, Wong SL, et al. Evaluation of mobile learning for the clinical practicum in nursing education: application of the FRAME model. Journal of Computing in Higher Education. 2019 Aug; 31(2): 290-310. https://doi.org/10.1007/s12528-019-09213-2

[29] Vallerand RJ. Deci and Ryan's self-determination theory: A view from the hierarchical model of intrinsic and extrinsic motivation. Psychological inquiry. 2000 Jan 1; 11(4): 312-8.

[30] Abbasi F, Khajouei R, Nejad MA, et al. Need Assessment and Development of a Mobile-based Medication Dosage Calculation Application for ICU nurses.

[31] Payne KF, Wharrad H, Watts K. Smartphone and medical related App use among medical students and junior doctors in the United Kingdom (UK): a regional survey. BMC Medical Informatics and Decision Making. 2012 Dec; 12(1). PMid:23110712 https://doi.org/10.1186/1472-6947-12-121

[32] King R, Taylor B, Talpur A, et al. Factors that optimise the impact of continuing professional development in nursing: A rapid evidence review. Nurse Education Today. 2020 Nov 7: 104652. PMid:33190952 https://doi.org/10.1016/j.nedt.2020.104652

[33] Murphy C, Cross C, McGuire D. The motivation of nurses to participate in continuing professional education in Ireland. Journal of European Industrial Training. 2006 Jun 1.

[34] Vázquez-Calatayud M, Errasti-Ibarrondo B, Choperena A. Nurses' continuing professional development: A systematic literature review. Nurse Education in Practice. 2020 Dec 29: 102963. PMid:33422973 https://doi.org/10.1016/j.nepr.2020.102963

[35] Van den Broeck A, Vansteenkiste M, De Witte H, et al. Capturing autonomy, competence, and relatedness at work: Construction and initial validation of the Work-related Basic Need Satisfaction scale. Jour-

nal of Occupational and Organisational Psychology. 2010 Dec; 83(4): 981-1002. https://doi.org/10.1348/096317909X481382

[36] Deci EL, Vansteenkiste M. Self-determination theory and basic need satisfaction: Understanding human development in positive psychology.

[37] Gagné M, Deci EL. Self-determination theory and work motivation. Journal of Organisational behavior. 2005 Jun; 26(4): 331-62. https://doi.org/10.1002/job.322

[38] Pijl-Zieber EM, Barton S, Konkin J, et al. Competence and competency-based nursing education: Finding our way through the issues.

[39] Dawson RM, Felder TM, Donevant SB, et al. What makes a good health 'app'? Identifying the strengths and limitations of existing mobile application evaluation tools. Nursing Inquiry. 2020 Apr; 27(2): e12333. PMid:31854055 https://doi.org/10.1111/nin.12333

[40] Alsalamah M. The trustworthiness of mobile Health applications for emergency medicine. Journal of Health Informatics in Developing Countries. 2017 Mar 5; 11(1).

[41] Lupton D. Apps as artefacts: Towards a critical perspective on mobile health and medical apps. Societies. 2014 Dec; 4(4): 606-22. https://doi.org/10.3390/soc4040606