Student Engagement in Concept Mapping in Flipped Clinical: A Theoretical Analysis

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ABSTRACT

Student engagement has emerged as an important topic in higher education, and researchers have determined that engagement in educational activities is vital if students are to retain what they learn. Retention of knowledge is crucial in a stressful healthcare environment; thus, educators must identify the associated engagement factors. Concept mapping—an active, student-centered learning strategy in which students construct a diagram to depict related concepts—offers learners a practical application to improve critical thinking, clinical reasoning, and engagement in educational activities. Using the same data and building on the findings from a previous basic qualitative study, in this article, we examine the theoretical basis for students' engagement during concept mapping in a flipped clinical learning environment. Accordingly, this article discusses the factors that influenced the engagement of students who completed concept mapping within a clinical learning environment and explains how the process of mapping patient care improved students' engagement in learning. Findings from the previous study indicated that the concept mapping process supported students to progress beyond participation to achieve self-direction, higher-level thinking, and improved clinical decision making. Theoretical implications from this analysis suggested that concept mapping, when used as a teaching strategy, is valuable for engaging students cognitively, physically, and emotionally. Implications also include the potential to help educators link curriculum design and delivery to student engagement.

Keywords: concept mapping, flipped clinical, student engagement, student retention, clinical reasoning

BACKGROUND AND CONTEXT

At the 2019 Symposium for the Scholarship of Teaching and Learning, Juliet presented the findings of a study of nursing students who practiced concept mapping during clinical practice using a flipped classroom structure. In a flipped classroom, students prepare at home with their textbooks and other resources and use class time for practical or applied activities (Üğüten & Balci, 2017). Participants in the previous study were meaningfully engaged in their learning when they practiced concept mapping in this unconventional learning environment. The data also revealed the factors that influenced engagement among nursing students who practiced concept mapping within a stressful clinical learning environment (Onabadejo, in press).

To write this article, we re-examined the data from that study to formulate a theoretical explanation of how the process of mapping patient care improved students' engagement in learning. The findings from that study aligned with the tenets of engagement theory identified by Kearsley and Shneiderman (1998) in that the students' meaningful engagement in their learning caused them to move beyond participation to self-direction, progress from basic understanding to higher-level thinking, and improve their skills of clinical decision making. This article is a further exploration of the theoretical implications of the techniques and findings from the previous study.

The aim of this analysis was to apply the findings to broaden engagement theory. Presenting students with a meaningful learning activity improved their engagement. Furthermore, students' descriptions of that improvement suggested ways educators can link curriculum design and method of delivery to support heightened student engagement. Authors such as Burch et al. (2015) have called for research on ways educators can connect curriculum design and its mode of delivery to enhance student engagement. We present a discussion of student engagement, a description of the previous study, and analysis of the theoretical implications of its findings.

Use of Learning Activities to Foster Student Engagement

Educators have tried various ways to maximize engagement and ensure that students are actively involved in constructing their learning (Burch et al., 2015). The meaning of "engagement" varies in different contexts. Engaging students in learning, according to Ke et al. (2016), means securing their participation in goal-directed behaviour that establishes a deep, meaningful involvement in learning activities. When students are engaged, they initiate inquiry, persevere to find solutions, unravel problems, master concepts, and apply new knowledge in a wide variety of circumstances (Ke et al., 2016). Engaged students are also likely to have a positive outlook on their learning. Engagement predicts student learning and the ability to apply that learning in diverse situations. Generally, engagement theory is derived from the precept that engaging students in learning generates positive outcomes (Kearsley & Shneiderman, 1998). The pursuit of these positive outcomes also reinforces the need for continuous assessment of active engagement in

instructional activities to ensure real engagement (Waggett et al., 2017).

Other researchers found that students who participated in determining their learning outcomes were more engaged. Francis (2018) linked rubrics to academic performance through the lens of student engagement and found grades were higher among students who engaged in deliberation and discussion of the rubric. Having analyzed learning as a way of interpreting and constructing meaning from experience, Francis concluded that engagement involved students self-selecting, participating, reflecting, contributing, and taking responsibility for their learning by analyzing the rubric. Similarly, Szeto et al. (2016), in a nonrandomized, quasi-experimental study, examined the effect of experiential learning activities on students' engagement in nutrition education. These authors documented an increase in students' interest and performance in learning about nutritional health with the use of experimental applications. Similary, the concept mapping in the initial study served as a focused learning activity to create a learning environment that fostered student engagement in learning with students taking part in determining the content of their map.

Use of Concept Maps to Foster Student Engagement in Nursing Education

Nurse educators have devised an array of exercises and activities to engage learners. One such activity is concept mapping. Concept mapping is an active learning strategy that motivates students while ensuring meaningful learning (Ab Latif et al., 2017). A concept map is a diagram that depicts the links between ideas in a meaningful way. Completing the map promotes learning because students arrange materials into an accessible cognitive structure during the mapping process (Ab Latif et al., 2017). This technique also enhances critical thinking skills, such as analysis, interpretation, inference, self-regulation, and comprehension of complex concepts (Kaddoura et al., 2016). Concept mapping can be useful in diverse fields in adult learning, in both formal and informal educational settings. Further, concept mapping and flipped learning have been used independently to motivate students while ensuring meaningful learning (Ab Latif et al., 2017; Nel, 2017).

In the context of nursing education, students' retention of and ability to apply knowledge in clinical situations is essential, and critical thinking is mandatory in professional nursing practice (College and Association of Registered Nurses of Alberta, 2019). Therefore, nurse educators apply assorted strategies to ensure learners construct knowledge from the course content and to generate eagerness and motivation about the subject matter (Raines, 2010).

While concept mapping in a flipped clinical environment has not been extensively applied in nursing education, its characteristic benefits align with the goals of knowledge retention, cognitive flexibility, and self-direction, which are necessary to produce high quality nurses (Onabadejo, in press). Therefore, in alignment with Felten's (2013) advice to keep examinations of students' learning grounded in context, the focus of the previous study was to combine the concept-mapping technique with a flipped clinical learning environment to encourage

undergraduate nursing students to engage in their learning (Onabadejo, in press).
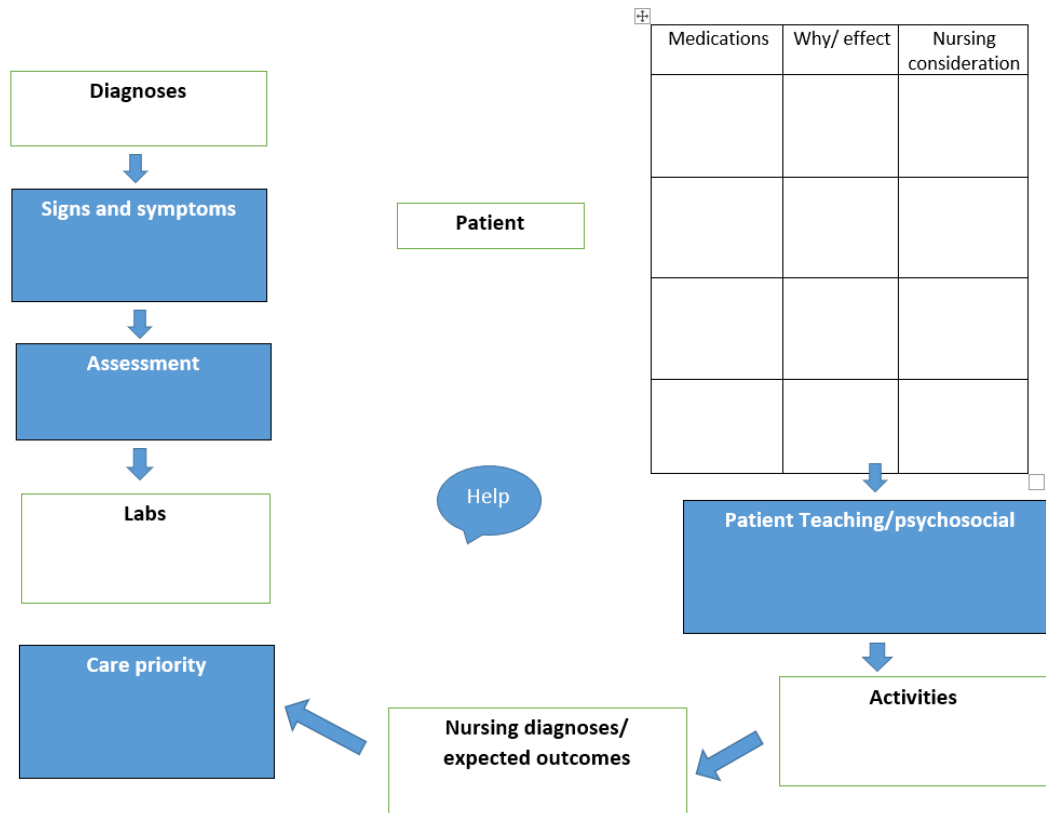
Overview of the Previous Study

The study participants were 12 second-year undergraduate nursing students registered in a medical-surgical clinical course. Participants' ages ranged from 19 to 36 years of age; 10 students identified as female and two as male. Following institutional ethical approval for the study, recruitment took place through e-mail from the clinical course rosters and in person at the course orientation by the principal investigator. To protect the educational experience of students and ensure data integrity, face-to-face interviews took place at the course exit after grades had been determined. The aim was to explore a novel method of learning by adding the component of concept mapping and generate new knowledge on the usefulness of flipped clinical teaching methods for undergraduate nursing students.

In the study, participants utilized concept mapping in a flipped clinical practice, methods which are not commonly used concomitantly in clinical teaching. According to the traditional methods of teaching this clinical course, students received their patient assignments the day before clinical practice and spent the night preparing their care plan. Using this approach, students indicated that they spent large amounts of time reading and researching because they did not know how much preparation was necessary. As a result, they arrived for clinicals with irrelevant information and tired after the long night of research.

Using the principles of the flipped classroom (Üğüten & Balci, 2017), instructors in this study gave students information such as general diagnoses and medications to study as soon as they registered for the course and before they attended clinical practice. Upon arrival for each clinical shift, students received patient assignments and then planned their care using a concept map template (Figure 1), which they could customize to align with how they process information. In this flipped clinical, students received their patient assignment in the ward on clinical day.

The flipped clinical and concept-mapping approach was intended to encourage students' engagement in their learning by allowing them to focus their inquiry, determine what more they needed to know, and construct their care plan with support as needed from the instructor on-site. During clinical practice, students started their mapping process with a piece of paper or a concept-map template (Figure 1). They input the patient's information from the chart in the order that matched their thinking process or in what they determined to be the best way to view and organize the information. For instance, a student could arrange the patient information by placing the patient's name or the diagnoses in the middle or at the top of the paper, depending on their thinking or organizational schema.

Figure 1

Concept Map Template

Medications	Why/ effect	Nursing consideration

Diagnoses

Signs and symptoms

Assessment

Labs

Care priority

Patient

Help

Nursing diagnoses/ expected outcomes

Patient Teaching/psychosocial

Activities

Data collected in the initial study included weekly diaries in which undergraduate nursing students recorded their experiences; students also participated in individual semi-structured interviews at the end of the course. The findings indicated that students were actively involved in mapping patient care, drawing connections between the concepts, and applying critical thinking throughout the process with the instructor's guidance. The students reported increases in their critical thinking abilities as a result of the practices. Most of the student participants pointed out that they linked the theory they learned in class to clinical applications and, conversely, transferred the clinical knowledge to class. They explained that because they had to continuously research and review patient information in clinical practice, they retained the information and increased their knowledge. Most of the student participants indicated they were able to remember information they learned while caring for previous patients and apply it to subsequent patients. Further analysis of the findings from the initial study, viewed through the lens of engagement theory, yielded insight and broader application of the principles of engagement for educators.

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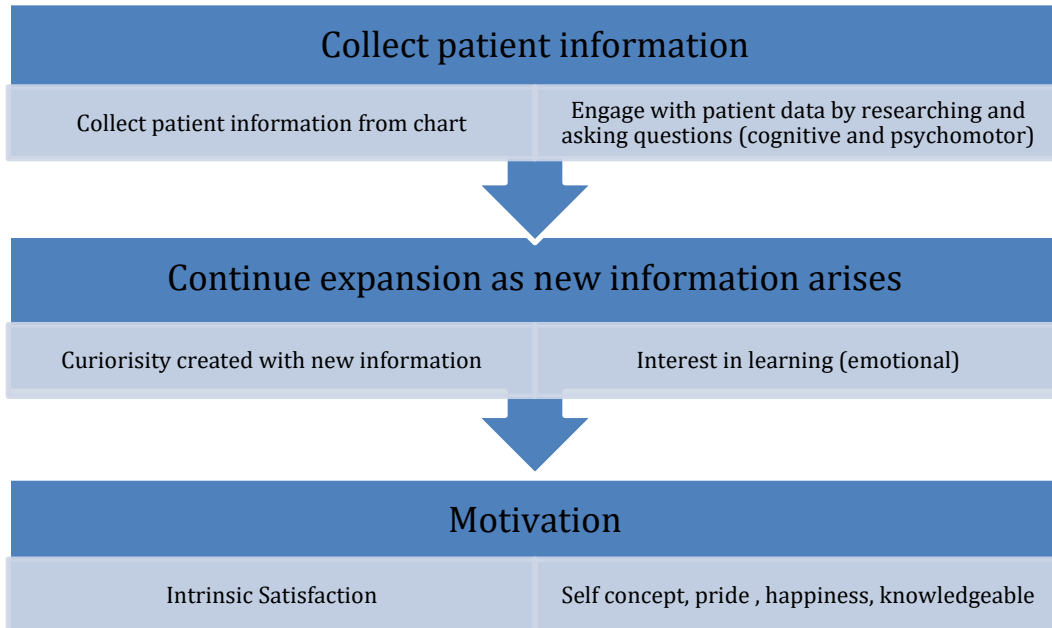
IMPLICATIONS FOR THEORY

Overview of Engagement Theory

Kearsley and Shneiderman (1998) formulated engagement theory, which holds that strategies to engage students must include meaningful activities. Lee and Hannafin (2016) indicated that such strategies should include interactions with others, motivational features, and relevant activities to intensify students' interest in learning. According to Waggett et al. (2017), determination of student engagement must account for psychological factors. Also, teaching strategies designed to engage students must stimulate learners to achieve lasting and meaningful engagement (Burch et al., 2015; Kearsley & Shneiderman, 1998). Findings from the initial study suggested that the engagement process propelled students beyond participation to self-direction, engaged their higher-level thinking, and led to improvements in their clinical decision making. This theoretical analysis revealed that concept mapping, when used as a teaching strategy, engaged students in the physical act of constructing the map, the intellectual activity of making connections and drawing conclusions, and emotional fulfillment as they improved their knowledge and expertise.

Figure 2 depicts the students' continuous engagement throughout the learning activity, from receiving their patient assignment to learning about their patient through concept mapping. Students' intrinsic satisfaction resulted from the realization that they were capable of making clinical decisions without the help of their instructors. Learners expanded their knowledge by using all available resources in the hospital to find information to complete their patient assignment. Further examination of the three facets of student engagement—cognitive, physical, and emotional—revealed implications for broader theoretical applications in educational settings.

Figure 2

Model Illustrating Concept Mapping and Continuous Engagement in Learning

Collect patient information	
Collect patient information from chart	Engage with patient data by researching and asking questions (cognitive and psychomotor)

Continue expansion as new information arises	
Curiorisity created with new information	Interest in learning (emotional)

Motivation	
Intrinsic Satisfaction	Self concept, pride , happiness, knowledgeable

Cognitive Engagement

Cognitive engagement was evident in the students' ability to link concepts and demonstrate critical thinking while making the connections. Similar to the high impact activities described by Lee and Hannafin (2016), concept mapping proved to be a focused and effective tool as students developed their cognitive processes and took actions intended to secure the best care for their patients. When used in a supportive environment, such as the flipped clinical practice with instructors present, concept mapping helped students integrate social relations and offered a diverse form of scaffolding that promoted deep engagement in learning. According to Kearsley and Shneiderman's (1998) theory, engaged learning involves cognitive processes such as problem solving, creativity, and decision making. The cognitive processing involved in concept mapping is true learning in the sense that students experience learning from multiple perspectives, and metacognition ensues.

Metacognition refers to a person's ability to understand their thinking and apply a learning strategy that promotes a sense of knowing (Materna, 2007). Students' sense of knowing and ability to expand their thinking process was clear among the participants in the study. Students understood they were free to adapt the tool to reflect their thought processes. This flexibility encouraged creativity, and students demonstrated deep engagement by asking, researching, seeking information, and connecting concepts. This process of seeking information and expanding the thinking process confirmed the theory that presenting students with a stimulating activity encourages engagement (Kearsley & Shneiderman, 1998).

The results of concept mapping in the study aligned with Cox et al.'s (2019) use

of causal diagrams to express mental representations when solving complex problems in geography. According to Cox et al., the use of mental representations is an important step in complex problem solving due to the complexity of causes and interconnectedness. In concept mapping, student participants were involved in connecting and contemplating their patients' care activities as well as applying prior learning and incorporating new information. These results validated the students' ability to connect theory to clinical applications and solve complex problems through concept mapping. This theoretical analysis helps to expand engagement theory by confirming that when students are presented with complex problems, engagement ensues during the problem solving (Cox et al., 2019). The engagement process extended beyond participation to self-direction, as shown in Figure 2, when students collected their patient information and engaged with patient data by asking questions. These activities led to continuous engagement, fueled by curiosity as new information developed.

Physical Engagement

The physical aspect of engagement in concept mapping consisted of the motor skills needed to actively complete the one-page concept map. Participants wrote information in delineated areas, noted relevant findings from their research, and drew arrows to represent the connections among concepts. According to Deater-Deckard et al. (2013), the motor movement or behavioural aspect of engagement derives from cognitive processing, which is made meaningful through the manipulation of the physical diagram. This dynamic process, according to Deater-Deckard et al., results from the combination of activity in the brainstem and motor cortex stimulation from the movement. In other words, the cognitive processes lead to stimulation and manipulation of the diagram, and curiosity stimulates the generation of new information. This phenomenon aligned with tenets of engagement theory in that learning about their patients encouraged learners' deep involvement in educational activities (Ke et al., 2016; Kearsley & Shneiderman, 1998).

From the current analysis, the outcome that resulted from the concept mapping experience was much more than completing a research task. Rather, learning was a meaningful experience that encouraged the participants' physical and emotional involvement. Students were actively engaged, and they were able to contribute to their learning. In alignment with engagement theory, the students moved into the emotional realm because they were motivated to learn about their patients, and learning about their patients was a valued responsibility (Kearsley & Shneiderman, 1998).

Emotional Engagement

The process of completing the concept map brought participants intellectual satisfaction, and it became an enjoyable activity that led to deeper interest in learning and motivation to learn, as shown in Figure 2. Emotional engagement represents the motivational impetus of the mapping process, which could be

positive or negative. The emotive aspect is critical to whether the students engage with the tool and use it to support learning (Deater-Deckard et al., 2013). The student participants in the study were engaged emotionally with the mapping process because they experienced an increase and expansion of their knowledge. The students felt more knowledgeable, realized that they were "thinking like nurses," and were able to arrive at clinical decisions with enhanced understanding of their patients, the patients' conditions, and the required interventions. Students' demeanors and responses to the interview questions conveyed emotions such as happiness and excitement about their achievement. As shown in Figure 2, the participants in the study took initiative in their learning as they gained intrinsic satisfaction, and most of the participants personalized the initial template to suit their thinking processes. This adaptation also indicated meaningful investment in the activity, as suggested by engagement theory.

Factors Influencing Continuous Engagement

Figure 3 illustrates the factors that influenced the students' continuous engagement. These factors became apparent with a re-examination of the data from the previous study, which can be explained through engagement theory. The implication is that if students are presented with a meaningful learning activity to improve engagement, motivation results. Applying those same principles may help educators link curriculum design and its delivery to student engagement (Burch et al., 2015). The analysis in Figure 2 also shows that students can be engaged cognitively, physically, and emotionally with concept mapping, thereby illustrating that the process of engagement supports students to extend beyond participation to self-direction, motivation, and intrinsic satisfaction. The model (Figure 2) illustrates continuous engagement, which aligns with the tenets of the engagement theory in that learning about their patients encouraged learners' deep involvement in educational activities (Ke et al., 2016; Kearsley & Shneiderman, 1998).

The chart in Figure 3 captures the core categories that emerged from the interviews, diaries, and researcher's field notes in the previous study. The model is dynamic and illustrates the ongoing engagement in learning during the concept mapping process. Box 1 represents the moment students became invested in the mapping process and engaged in holistic thinking or "thinking like a nurse," which marked the beginnings of continuous engagement (Box 2). The one-page layout of the concept map stimulated different ways of thinking (Box 3), according to participants, and made it easy to determine what they needed from the patient's chart and what information to review.

Figure 3

Factors Influencing Continuous Engagement
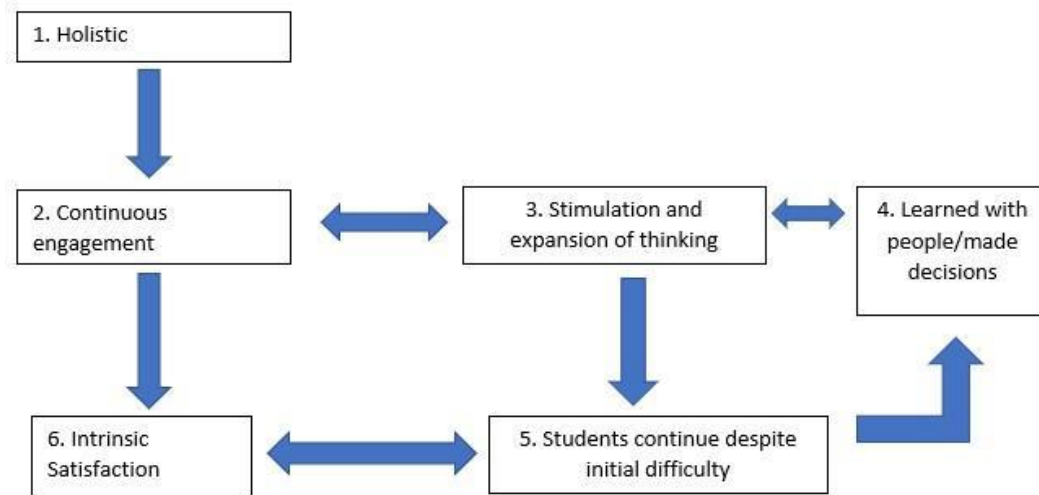
Participants in the study utilized all available resources, including their instructor, staff, and patients (Box 4), while making the connections. They persevered and maintained engagement despite challenges and initial difficulties (Box 5). The opportunity to process the information they accessed created meaningful learning because participants saw their thinking process change during the process of doing their research, and they called this experience "thinking like a nurse" or holistic thinking. All of this analytical activity led back to more holistic thinking, continuous engagement, and consideration of intrinsic factors (Box 6).

As illustrated in Figure 3, the concept of continuity of the engagement connects to other factors, such as stimulation of thinking, expansion of the thinking process, and connection of information. Most participants from the study indicated concept maps were a novel way to organize their learning and support their development in clinical practice. This level of participation and involvement led to improved student motivation and self-direction (Figure 2), and such engagement may confer other benefits and yield insight on broader applications of the principles of engagement for educators.

This analysis of theoretical implications may be helpful to nursing faculty who are in constant need of models to encourage eagerness and emphasize course outcomes in multifaceted healthcare settings (Raines, 2010). The findings from this analysis may also assist educators in similar fields as they attempt to link curriculum design with course delivery. Given that this analysis stems from a re-examination of previous research data, other researchers could design a new study in a similar or a different learning environment. Researchers may compare concept mapping activities in different types of clinical teaching environments or in classrooms.

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DISCUSSION AND CONCLUSION

The findings from this theoretical analysis showed students were highly involved in creating their care maps and committed to learning while engaging with the activity. Being able to collaborate with their instructor from when they collected their patient charts at the start of their clinical day made that engagement and learning more effective. Concept mapping provided students a meaningful, focused activity that helped engage their learning and expand their thinking processes.

The results obtained in the initial study (Onabadejo, in press) aligned with the tenets of engagement theory. The findings confirmed that the use of meaningful learning activities improved students' learning. According to engagement theory, strategies to engage students must include interactions with others, motivational features, and applicable activities to intensify their interest in school (Kearsley & Shneiderman, 1998). According to Waggett et al. (2017), monitoring of engagement must include psychological factors, as was evident in the study. Engagement activated emotional factors that prompted students to progress beyond participation to the desire and commitment to make a contribution to greater learning and the self-motivation necessary to achieve a personal goal, such as "thinking like a nurse" or holistic thinking.

The findings of Onabadejo (in press) established concept mapping as an engagement activity that helped improve students' learning in a flipped clinical setting. Understanding this process may help nurse educators and professionals in similar disciplines in examining the link between learning activities and students' engagement. Students were actively engaged cognitively, physically, and emotionally as they mapped their patient care (Figure 3). Also, the model (Figure 2) illustrates continuous engagement and aligned with the tenets of engagement theory in that learning about their patients encouraged learners' deep involvement in educational activities (Ke et al., 2016; Kearsley & Shneiderman, 1998). Other researchers may compare concept mapping activities in different types of clinical teaching, since the study described used a flipped clinical environment. Researchers could also conduct new studies in a similar environment since this analysis derived from a re-examination of data from a previous study.

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REFERENCES

Ab Latif, R., Dahlan, A., Abdul Mulud, Z., & Mat Nor, M. Z. (2017). The impact of Rusnani concept mapping (RCM) on academic achievement and clinical practices among diploma nursing students. *Education in Medicine Journal*, *9*(4), 1–12. https://doi.org/10.21315/eimj2017.9.4.1

Burch, G. F., Heller, N. A., Burch, J. J., Freed, R., & Steed, S. A. (2015). Student engagement: Developing a conceptual framework and survey instrument. *Journal of Education for Business*, *90*(4), 224–229. https://doi.org/10.1080/08832323.2015.1019821

College and Association of Registered Nurses of Alberta. (2019). *Entry-level competencies for the practice of registered nurses*. https://nurses.ab.ca/media/5ndpyfar/entry-level-competencies-for-the-practice-of-registered-nurses-mar-2019.pdf

Cox, M., Elen, J., & Steegen, A. (2019). Students' reasoning processes while constructing causal diagrams. *Review of International Geographical Education Online*, *9*(1), 13–35. https://doi.org/10.33403/rigeo.573464

Deater-Deckard, K., Chang, M., & Evans, M. E. (2013). Engagement states and learning from educational games. *New Directions for Child and Adolescent Development, 2013*(139), 21–30. https://doi.org/10.1002/cad.20028

Felten, P. (2013). Principles of good practice in SoTL. *Teaching & Learning Inquiry*, *1*(1), 121–125. https://doi.org/10.20343/teachlearninqu.1.1.121

Francis, J. E. (2018). Linking rubrics and academic performance: An engagement theory perspective. *Journal of University Teaching & Learning Practice*, *15*(1), 5–22. http://ro.uow.edu.au/jutlp/vol15/iss1/3

Kaddoura, M., Van-Dyke, O., & Yang, Q. (2016). Impact of a concept map teaching approach on nursing students' critical thinking skills. *Nursing and Health Sciences, 18*(3), 350–354. https://doi.org/10.1111/nhs.12277

Ke, F., Xie, K., & Xie, Y. (2016). Game-based learning engagement: A theory- and data-driven exploration. *British Journal of Educational Technology, 47*(6), 1183–1201. https://doi.org/10.1111/bjet.12314

Onabadejo, J., & Camacho, R. (2022). Student engagement in concept mapping in flipped clinical: A theoretical analysis. *Imagining SoTL, 2*(1), 39–52.

Kearsley, G., & Shneiderman, B. (1998). Engagement theory: A framework for technology-based teaching and learning. *Educational Technology, 38*(5), 20–23. www.jstor.org/stable/44428478

Lee, E., & Hannafin, M. J. (2016). A design framework for enhancing engagement in student-centred learning: Own it, learn it, and share it. *Educational Technology Research and Development*, *64*(4), 707–734. https://doi.org/10.1007/s11423-015-9422-5

Materna, L. (2007). *Jump-start the adult learner: How to engage and motivate adults using brain-compatible strategies*. Corwin.

Nel, L. (2017). Students as collaborators in creating meaningful learning experiences in technology-enhanced classrooms: An engaged scholarship approach. *British Journal of Educational Technology, 48*(5), 1131–1142. https://doi.org/10.1111/bjet.12549

Onabadejo, J. (in press). Concept mapping in a flipped clinical. *The Canadian Journal of Teaching and Learning.*

Raines, D. A. (2010). An innovation to facilitate student engagement and learning: Crossword puzzles in the classroom. *Teaching & Learning in Nursing, 5*(2), 85–90. https://doi.org/10.1016/j.teln.2008.08.003

Szeto, A., Haines, J., & Buchholz, A. C. (2016). Impact of an optional experiential learning opportunity on student engagement and performance in undergraduate nutrition courses. *Canadian Journal of Dietetic Practice and Research, 77*(2), 84–88. https://doi.org/10.3148/cjdpr-2015-038

Üğüten, S. D., & Balci, Ö. (2017). Flipped learning. *Journal of Süleyman Demirel University Institute of Social Sciences*, *26*(1), 253–265. https://publons.com/journal/346546/journal-of-suleyman-demirel-university-institute-o/

Waggett, R. J., Johnston, P., & Jones, L. B. (2017). Beyond simple participation: Providing a reliable informal assessment tool of student engagement for teachers. *Education*, *137*(4), 393–397. https://www.ingentaconnect.com/content/prin/ed/

Onabadejo, J., & Camacho, R. (2022). Student engagement in concept mapping in flipped clinical: A theoretical analysis. *Imagining SoTL, 2*(1), 39–52.