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The impact of combining concept-based learning and concept-mapping pedagogies on nursing students' clinical reasoning abilities☆

Imad Alfayoumi[1]

Isra University, P.O. Box 22, 11622 Amman, Jordan

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ABSTRACT

Background: Integrating contemporary teaching strategies into the nursing curriculum is an effective approach to enhance undergraduate clinical-judgment and reasoning abilities.
Objective: This study aims to document the impact of blending the teaching strategies of concept-based learning and concept-mapping to enhance nursing students' clinical-reasoning abilities.
Design: A quasi experimental design is used to guide data collection from second year students.
Setting and participants: A consecutive sample of all students undertaking adult health nursing courses at a private university in Jordan and meeting the eligibility criteria resulted in (N = 40).
Method: Data was collected via a questionnaire and observation to reveal students' independence in both clinical-reasoning and clinical-judgment. General Clinical-Reasoning Behavior Scale, Independence in Clinical-Reasoning and Clinical-Judgment scales were completed by the students at the beginning and end of the courses.
Results: Despite requesting extensive preparation time, concept-based learning and concept-mapping as student-centered approaches enabled the move away from a content laden approach towards constructing criteria against which various patients' encounters were reflected. This study documented enhancement in students' independence in clinical-reasoning and clinical-judgment as they learned to take command of the elements of their clinical-reasoning. Significant improvement in students' general clinical-reasoning behavior was also documented.
Conclusion: The data collection tools utilized in this study can be used as clinical teaching aides, hence maximizing the impact of blended teaching strategies by providing the faculty with specific feedback regarding students' clinical reasoning and judgment abilities. Institutionalizing these processes by initiating relevant policies and guidelines is essential to help students take command of their clinical-reasoning, maturity, and responsibility in a practice area that is constantly changing and evolving.

1. Introduction

Effective Clinical-reasoning (CR) is the antecedent to sound Clinical-judgment (CJ) (Tanner, 2006) and involves the recognition and response to unfolding clinical situations by nurses (Levett-Jones, 2013). Levett-Jones et al. (2010) emphasized global reports in the USA and Australia describing critical patient incidents that often involved poor CR by graduate nurses and indicated unsafe CR scores in more than two-thirds of novice nurses. A more recent report indicated that critical patient events were linked to a lack of CR skills among newly-licensed nurses (Hart et al., 2015). A Middle Eastern report paralleled this finding and indicated that many graduates were unable to demonstrate suitable decision-making skills (Jahanpour et al., 2010).

In facing the challenges outlined, changes are called for in undergraduate clinical education to meet the accelerated demands of the changing healthcare system for competent graduates who can undertake effective clinical judgments (Tanda and Denham, 2009; Tanner, 2006). Hence, nursing educators need to identify workable strategies for nursing students to reach these judgments (Ferrario, 2003; Simmons, 2010). Unfortunately, the available evidence applicable to educational strategies and the development of CR in nursing students is scarce (de Menezes et al., 2015).

Integrating contemporary teaching strategies into the nursing curriculum is an effective approach to enhance undergraduate CJ and reasoning abilities. Among these strategies are concept-based learning to guide clinical practice (Cappelletti et al., 2014; de Menezes et al.,

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E-mail address: nursing@iu.edu.jo.

[1] The author is currently working at Isra University and was working at Isra University at the time of conducting the study.

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2015; Lasater and Nielsen, 2009) and concept-mapping as a classroom teaching pedagogy (Cappelletti et al., 2014; de Menezes et al., 2015; Wheeler and Collins, 2003). Concept-based learning has been identified as an effective clinical teaching approach that offers students a way to learn about foundational concepts which will increase their clinical knowledge and in-depth thinking (Heims and Boyd, 1990; Lasater and Nielsen, 2009; Nielsen, 2013). Pain management, fluid and electrolytes balance, and patient safety are examples of clinical concepts against which students' patient assignments will be reflected and debriefed in the post-conferences at the end of clinical days (Lasater and Nielsen, 2009). Concept-based learning activities also impact what the student brings to the situation (Cappelletti et al., 2014) and direct students to identifying significant cues in patient care (Nielsen, 2009). These processes will facilitate better and immediate connection of theory with practice and enhance the development of CJ (Nielsen, 2013). Deep student learning is subsequently attained (Nielsen, 2013) and students will gradually become familiar with the patient population and clinical environment (Nielsen, 2009), thus enhancing their knowledge and decision-making capabilities (West, 2016).

Concept-mapping was developed by Novak in 1972 to promote critical thinking (Gul and Boman, 2006). The implementation of concept-mapping includes: assimilating new concepts in circles or boxes; creating hierarchical arrangements between concepts and sub-concepts; and identifying relationships between concepts and sub-concepts that can be connected with lines or linking words (Rochmawati and Weichula, 2010). It is proven that concept-mapping has contributed to the enhancement of undergraduate CJ skills (Gerdeman et al., 2013).

Combining multiple pedagogies can enhance aspects of CJ among both experienced and novice nurses (Smith et al., 2013). It has been noted in the literature that advancement in student learning occurred when concept learning strategies were used in conjunction with other strategies (West, 2016). Along these lines, this study, as part of a curriculum reform project, seeks to determine the impact of combining concept-based learning and concept-mapping pedagogies on CJ and reasoning in baccalaureate nursing students undertaking adult health courses at a private teaching facility in Jordan.

2. Research Hypothesis

Combining concept-based learning and concept-mapping pedagogies positively impacts baccalaureate nursing students' general CR behavior, and independence in CR and CJ while undertaking adult health nursing courses.

3. Methodology

This study uses a one group pretest-posttest quasi-experimental design to guide data collection. Preserving subjects' rights of beneficence and justice (Polit and Beck, 2012) demands recruiting a consecutive non-random sample that includes all students enrolled in an adult health nursing course. Adult Health Nursing Two is a continuation of Adult Health Nursing One course. A control group is not employed as both concept-based learning and concept-mapping pedagogies were proven to be effective in enhancing students' CJ, reasoning, and critical thinking (Lasater and Nielsen, 2009; Rochmawati and Weichula, 2010). With baseline data obtained before introducing the two pedagogies and post-test knowledge and skills collected immediately after this intervention, it may be reasonable to infer that the intervention is the most plausible explanation for knowledge and skill gains (Polit and Beck, 2012). Observation of students' independence in CR and CJ by the Clinical Instructors (CIs) is employed in conjunction with students' self-reporting as a means of methodological triangulation (Polit and Beck, 2012) to increase the credibility of the collected data.

3.1. Population and Sample

A consecutive sample of all students who met the following inclusion criteria was recruited (N = 40).

3.2. Inclusion Criteria

1. Students undertaking either Adult Health Nursing one or Adult Health Nursing Two course with its theoretical and practicum components in semester one of the academic year 2015.
2. Can read Arabic and English fluently.
3. Agree to participate in the study.

3.3. Data Collection Methods and Instruments

The study utilized the following data collection methods and scales:

A. A questionnaire containing the following four sections was administered to the students by the CIs at both the beginning and end of the semester. The scales' validity and reliability were previously assured (Alfayoumi, 2017).
   1. Participant Demographic Sheet:
      This section includes a student's age, sex, academic level, Grade Point Average (GPA) and his/her perception of his/her academic success. These variables are blocked to eliminate possible influences on the dependent variables of the study.
   2. General CR Behavior Scale:
      The literature provided consistent evidence that CR is a contextual mental ability (Benner et al., 2009; Tanner, 2006). Alfayoumi (2017) developed a 26-item 5-point Likert type scale (Fig. 1) to measure students' contextual General CR Behavior. Scale's areas included antecedents, processes, reasoning patterns, and consequences of CR. Specific areas included relationship with the patient; contextual CR aspects, including feeling part of the nursing team and team's reliance on the student; students' responsibility towards learning; having full control over daily activities and knowing the next step; possessing the needed confidence; accuracy of CJ and being able to verify CJ at all times; reasoning styles including analytic, intuitive, and reflective patterns; inquisitiveness; and undertaking timely actions. Two culture-sensitive items were added to uncover students' ability to deal with patients or family members of opposite sex to theirs.
   3. Independence in CJ:
      Part three was developed to explore the level of independence in patient care judgments when the student assessed patients to identify significant cues; interpreted data to identify patient problems; and to decide whether or not to intervene, respond, or take an action. These patient-care areas stemmed from Tanner's (2006) definition of CJ. For the three items of this scale, respondents are requested to choose from among four alternatives. The independence level is operationally defined to ascertain how often the student relied on the preceptor when undertaking patient care CJs (Alfayoumi, 2017). The response choices ranged from ‘constantly relying on preceptor’ to ‘making all CJs and the preceptor supporting them’. Despite the latter choice representing the highest independence level, it also recognized the preceptor's accountability as student decisions need to be supported by the preceptor. Each student is working alongside a preceptor who is a staff nurse undertaking teaching responsibility while providing nursing care to the patients (O'Connor, 2015).
   4. Independence in CR:
      Part four of the questionnaire also utilized a multiple-choice format to ascertain the level of students' independence in CR and subsequent decision-making and action after observing significant cues and patients' problems. The four alternative questions are structured to determine a student's level of

General Clinical Reasoning Behavior

Indicate your degree of agreement or disagreement with the following statements

Key:
SA: Strongly Agree A: Agree UD: Undecided
D: Disagree SD: Strongly Disagree

Statement	SA	A	UD	D	SD
1. I constantly feel that I am part of the nursing team					
2. My relationship with patients is below average					
3. I need prompting, help from the preceptor to initiate a therapeutic relationship with patients					
4. I have full control over my daily activities					
5. I lack confidence when making clinical judgments					
6. I constantly know the next step in patient care					
7. All of my clinical judgments are accurate					
8. I am able to verify my clinical judgments at all times.					
9. I am anticipating patient's situation before there is sufficient data about his/her condition.					
10. My mode of thought is analytic and logical.					
11. I am continuously examining & thinking about my patient care actions/judgments after been implemented.					
12. Learning is my responsibility.					
13. I have a professional communication style.					
14. I can question vague doctors' orders.					
15. The team constantly relies on me.					
16. I am asking the right questions.					
17. I am asking the right people.					
18. I am a habitual reader.					
19. My actions are timely.					
20. Patients are accepting me as a care provider.					
21. I recommend to the NM corrective actions for unit problems.					
22. I question unwanted behavior of unit staff.					
23. I can answer the phone calls to the unit.					
24. I can respond to doctors' queries during rounds.					
25. I can easily deal with patients of opposite sex to mine.					
26. I can easily deal with patients' family members of opposite sex to mine.					

Fig. 1. General clinical reasoning behavior.

independence in their CR. The independence level in CR is operationally defined as how often the student relied on his/her preceptor to determine significant cues, patient problems, and take the required action needed in patient care encounters (Alfayoumi, 2017). The options ranged from 'independent (alone) at all times' to 'dependent on the preceptor at all times'. The patient care aspects of this scale were also based on Tanner's (2006) definition of CR.

To validate students' self-reporting of his/her independence in both CJ and CR, the CI of the particular student was asked to complete the independence scales indicating the student's level of independence regarding various aspects of both CJ and CR. A two-hour observation of the student's actual performance was employed by the CI. The time sampling procedure assigned an

hour per day for two consecutive days to document a student's independence level.

3.4. Ethical Considerations

Ethical and research approvals were obtained from the Deanship of Scientific Research at the University. Using the instruments is permitted by the copyright owner; the author of this study. To assure students that the information obtained from subjects will not be used against them, blinding procedure (Polit and Beck, 2012) was employed by assigning code numbers to students' subjects by a secretary located away from the research team.

3.5. Data Analysis and Results

The researcher utilized SPSS (version 20) statistical software to analyze the collected data. All subjects (N = 40) completed the questionnaire in the two episodes. Results showed that the majority of study participants are males (n = 30) and are between the age of 20 and 21 (n = 19). The GPA of twenty-two of them (55%) ranged between 60 and 69.

A sample size of 40 subjects is considered sufficient by some authors (Ghasemi and Zahediasl, 2012) to abandon normality testing procedures. However, normality testing preceded the decision to utilize parametric versus non-parametric testing procedures for hypotheses testing. Shapiro-Wilk normality test was performed for the data sets of all study variables.

Pre-post results (Table 1) of students' perceptions of their academic success indicated changes in both the mean and the standard deviation of both theoretical and clinical academic success measures. For the entire set of the academic success variables, Shapiro-Wilk normality test measures indicated that the data came from a non-normally distributed population (p-values < 0.001). Wilcoxon signed ranks test measures indicated a significant improvement in students' perceptions of their clinical, rather than theoretical, academic success ($Z = -2.236$, $p = 0.025$) at the end of the clinical course.

Testing of the main research hypothesis utilized the paired samples t-test to reveal significant impacts of combining concept based learning and concept-mapping pedagogies on both students' general CR behavior and their independence in CR and CJ while undertaking adult health nursing courses. The test was performed after normality was assured for the entire pretesting and post-testing data sets of both students' general CR behavior and their independence in CR. As Table 2 shows, significant improvements are evident in both students' general CR behavior (-3.11, $p = 0.005$) and their independence in CR (-2.24, $p = 0.032$) as reported by the students themselves. The latter is supported by a significant improvement (-6.15, $p < 0.001$) observed by students' CIs.

Students indicated significant improvement in five of the twenty-four aspects of the general CR behavior at the end of the clinical course (Table 3). Students reported that they perceived all of their CJ as accurate; they were asking the right questions; their actions were timely; and they dealt easily with patients' family members of gender opposite to theirs. Normality testing by the mean of Shapiro-Wilk test indicated that the data relevant to these variables came from a non-normally distributed population which demanded the use of Wilcoxon signed ranks test as a non-parametric measure (Table 3).

Table 1
Students' perceptions of their academic success.

Students perceptions	Pre		Post	
	Theory (%)	Clinical (%)	Theory (%)	Clinical (%)
1. Average	25 (62.5%)	9 (22.5%)	22 (55%)	4 (10%)
2. Above average	7 (17.5%)	20 (50%)	10 (25%)	22 (55%)
3. Excellent	3 (7.5%)	6 (15%)	5 (12.5%)	11 (27.5%)
Missing	5 (12.5%)	5 (12.5%)	3 (7.5%)	3 (7.5%)
N	40 (100%)	40 (100%)	40 (100%)	40 (100%)
Mean (out of 3):	1.37	1.9	1.53	2.18
Standard deviation:	0.646	0.658	0.73	0.616

As normality of the academic success variables was not assured (p-values < 0.001), Spearman's Rho correlation coefficient was used to reveal relationships between various study variables. The first set was performed to establish the relationship between students' GPA and their perceptions of their academic success. Results indicated a significant relationship between students' GPA and their perceptions of their theoretical academic success at both the beginning ($r = 0.643$, sig < 0.001) and end ($r = 0.540$, sig < 0.002) of the adult clinical training course.

The second set of correlations was performed to reveal relationships between the overall results of various scales at both the beginning and end of the clinical courses. As indicated earlier, normality was assured for the entire pretesting and post-testing data sets of both students' general CR behavior and their independence in CR. Therefore, Pearson's product-moment correlation coefficient was utilized, as a parametric measure, to reveal relationships between these variables. The values (r) in Table 4 indicate that the general CR behavior as perceived by the students shows a significant relationship with both students' independence in CJ and their independence in CR as observed by the CIs at the end of the semester. The independence in CJ and independence in CR as perceived by the students were significantly correlated with each other ($r = 0.501$, sig < 0.001) and respectively with students' perceptions of their theoretical academic success ($r = 0.360$, 0.402, sig. 0.033, 0.017) at the beginning of the semester. The latter was also correlated with the total general CR behavior ($r = 0.359$, sig. 0.044) at the beginning of the semester and also with students' independence in CR ($r = 0.463$, sig. 0.004) at the end of the semester. Students' independence in CJ and their independence in CR as observed by the CIs were positively correlated at both the beginning and end of the semester.

Of the sub-items of the independence scales, students' independence in CJ when assessing patients to identify significant cues (CJ1), as observed by the CIs, was positively correlated with all sub-items of the independence scales and also with scales' overall scores at the end of the clinical course. In addition to these significant relationships, Table 5 also highlights a significant relationship between this sub item (CJ1) as observed by CIs and the total CR behavior as reported by the students. These relationships were revealed by using Spearman's Rho correlation coefficient as homogeneity of the data set of the variable CJ1 as observed by CIs was not assured by the mean of Shapiro Wilk test (p-values < 0.001).

Significant results linked with students' demographics were also evident. Normality testing was performed as some of the categorical groups of these variables had few students. A departure from normality was conquered, by the mean of Shapiro-Wilk test, with students' independence in CR as rated by their CIs for the male and female categories. Mann-Whitney U test revealed that female students possessed more independence in CR than male students (sig. 0.015) as rated by their CIs. For the second independence variable, the t-test results indicated that female students possessed more independence in CJ ($t = 2.106$, sig. 0.047) than male students as rated by students' CIs at the end of the clinical course. As the significance level of the later variable is approaching the 0.05 level, Mann-Whitney U test as a non-parametric measure was performed and indicated a non-significant result (sig. 0.077). Therefore, this variable is dropped from the significance list for the sake of making credible inferences. The correlation coefficient values indicated that older students possessed more independence in CJ than younger ones at both the beginning ($r = 0.335$, sig. 0.049) and end ($r = 0.360$, sig. 0.034) of the clinical course as observed by the CIs. Moreover, the age was positively correlated with students independence in CR ($r = 0.364$, sig. 0.032) as rated by the CIs at the end of the semester.

Table 2
Impact of combined pedagogies on students' CR and CJ.

Variable	Pre		Post		Confidence interval	t-Value	Sig. (2 tailed)*
	Mean (out of 100)	SD	Mean (out of 100)	SD			
1. General CR behavior	72	9.6	76	8	(−6.98, −1.42)	−3.11	0.005*
2. Independence in CJ (students' perceptions)	62	20.6	66	19.3	(−12.92, 3.61)	−1.147	0.260
3. Independence in CR (students' perceptions)	66	14	71.5	13	(−12.15, −0.59)	−2.24	0.032*
4. Independence in CR (CI observation)	53.5	18	67	19	(−17.72, −8.95)	−6.15	<0.001*
5. Independence in CJ (CI observation)	49	19	64	20	(−20.54, −10.72)	−6.43	<0.001*

* Significant at 0.05 α level.

Table 3
Significant aspects of general CR behavior.

	Wilcoxon signed ranks test	
Significant aspect	Z	Asymp. sig. (2-tailed)*
All of my CJs are accurate	−1.99	0.047
I am asking the right questions.	−2.128	0.033
My actions are timely.	−2.053	0.040
I can easily deal with patients' family members of opposite sex to mine.	−2.077	0.038

* Significant at 0.05 α level.

4. Discussion

The findings of the present study confirmed the efficacy of combining concept-based and concept-mapping pedagogies on both students' general CR behavior and their independence in CR and CJ while undertaking adult health nursing courses. These variables were either self-reported by the students or observed and rated by the CIs. The significant improvement in students' independence in CR at the end of the clinical course highlighted congruencies between students' perceptions and CIs' observations of this variable. These congruencies indicate that students' ability to observe and act on significant cues, problems, or needed actions or interventions improved throughout adult health nursing courses. Furthermore, students' independence in CJ as observed and rated by the CIs has significantly improved in all of its aspects by the end of the clinical course. Students self-reporting on this variable indicated improvements (mean changes from 62 to 66), rather than significant changes ($t = -1.147$, $p = 0.260$), at the end of the clinical course. These improvements indicate congruency between students' self-reporting and CIs' observations of students' CJ when assessing patients to identify significant cues; when interpreting data to identify patient problems; and when deciding to intervene, respond, or take an action (or not). The insignificant but progressing students' independence in CJ as reported by the students may be attributed to the relatively high pre-test self-rating (Polit and Beck, 2010), or to the marginal confidence level reported by the students at the end of the semester.

The insignificant findings linked with aspects relevant to students' general CR behavior included various contextual CR variables and others relevant to either to students' responsibilities towards learning or to their relationship with patients. The insignificant contextual CR aspects were those that could have contributed to an increase in the students' feeling of belongingness to the placement area and its team which, in turn, could have been reflected in more control over daily activities and in knowing the next step in patient care. When the latter aspect is fulfilled, it will subsequently increase the team's reliance on students' abilities—which will positively impact students' confidence. Unfortunately, as student confidence remained unapparent, evidence supporting his/her contextual involvement continued to be invisible. For example, students did not have the courage to respond to phone calls to the unit; ask for clarification when the physician's orders were unclear; question unwanted staff behaviors; or respond to a physician's queries.

The insignificant CR aspects relevant to a student's responsibility

Table 4
Correlations (r) between overall scales' results.

Variables		General CR behavior		Independence in CJ (students' perceptions)		Independence in CJ (CI observation)		Theoretical academic success	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post
General CR behavior	Pre							0.359* (0.044)	
	Post								
Independence in CR (students' perceptions)	Pre			0.501** (0.000)				0.402* (0.017)	
	Post								0.463** (0.004)
Independence in CJ (students' perceptions)	Pre							0.360* (0.033)	
	Post								
Independence in CJ (CI observation)	Pre								
	Post		0.471** (0.009)						
Independence in CR (CI observation)	Pre					0.847** (0.000)			
	Post		0.468** (0.009)				0.835** (0.000)		

** Correlations are significant at the 0.01 level (2-tailed).
* Correlations are significant at the 0.05 level (2-tailed).

Table 5
Correlations (r) between CJ1 (CI) and independence sub-items & Totals (post).

	GPA	Independence in CJ1 (CI)[a]	Independence in CJ 2 (CI)[b]	Independence in CJ 3 (CI)[c]	Independence in CR 1 (CI)[d]	Independence in CR 2 (CI)[e]	Independence in CR 3 (CI)[f]
Independence in CJ1 (CI)[a]	0.376* (0.031)	1	0.827** (0.000)	0.794** (0.000)	0.749** (0.000)	0.595** (0.000)	0.475** (0.002)
Total Independence in CJ (CI)		0.929** (0.000)					
Total Independence in CR (CI)		0.392* (0.012)					
Total general CR		0.455* (0.011)					

** Correlations are significant at the 0.01 level (2-tailed).
* Correlations are significant at the 0.05 level (2-tailed).
[a] Independence in CJ when assessing patient to identify significant cues.
[b] Independence in CJ when interpreting data to identify patient's problems.
[c] Independence in CJ when deciding to intervene.
[d] Independence in CR when figuring out significant cues during patient assessment.
[e] Independence in CR when figuring out patient's problems.
[f] Independence in CR when figuring out the needed action/intervention.

towards learning included the ability to verify CJ at all times, asking the right people, and being responsible for their own learning and reading. Insignificant aspects relevant to a student's relationship with the patients constituted the final bundle of students' CR behavior that may hinder a student's ability to initiate a therapeutic relationship with the patient. As their perceived relationships with patients throughout clinical rotations remained below average, while also lacking the required communication skills to initiate therapeutic relationships with patients, students indicated that they were rarely accepted as healthcare providers—particularly by those patients of the opposite sex.

These findings are consistent with the report of Sedgwick et al. (2014) who indicated that novices' engagement in CR and decision-making was influenced by their relationship with other staff members. Students' actions, feelings and their relationships with their patients were among the factors necessary for the development of their decision-making abilities (de Menezes et al., 2015). Hart et al. (2014) indicated that self-confidence has also impacted nurses' ability to recognize, assess, and intervene during clinical deterioration events.

This study situated the initial CJ independence component as a major factor that might contribute to the development of students' CJ and CR abilities. Strong relationships were revealed between students' independence in CJ when assessing patients' conditions to identify significant cues and the entire set of CJ and CR independence components. Students' ability to independently assess a patient's condition and identify significant cues is similar to what is termed as “noticing” in CR research (Nielsen, 2009; Watson and Rebair, 2014). Noticing is the precursor for CR, and judgment and is only possible when students are able to draw on their knowledge of patterns of recovery gained from past experience, formal learning, or knowledge of the particular patient's patterns of responses (Watson and Rebair, 2014). Poor attentiveness to patient needs and poor communication are superior to the factors hindering these processes (Watson and Rebair, 2014). Engaging students in well-formulated placement groups can help in enhancing students' communication and attention to patient needs. For example, distributing female and older students among various clinical placement groups can enrich the narrative-reflective discussions. Coupled with CI assistance, the female and older students can also help other students initiate therapeutic relationships with their patients. The older students in the program are those who are bridging from a diploma to a bachelor level. Students' contextual CR behavior and their independence in both CR and CJ may be enhanced when students with a higher GPA are distributed among the placement groups, especially at the beginning of the adult health nursing course. Despite being limited to four out of twenty-six aspects, the significant elements of the general CR behavior may also be utilized to enhance students' independence in CR and CJ, in addition to improving their confidence. Students' feeling that their clinical-judgments were accurate; they were asking the right questions; and their actions were timely need to be substantiated in future research by considering CIs' observations of students' CR behavior as a triangulation technique to validate students' self-reports.

Despite requiring substantial preparation time, the blended teaching strategies of concept-based learning and concept-mapping enabled the move away from content laden courses (Mcgrath, 2015) towards placing the student at the centre of the teaching-learning process to construct knowledge essential for every day practice (West, 2016). These deep mental processes are hardly attained without proper instructional support (Pouralizadeh et al., 2017; Thomson et al., 2017). This type of support that targets students' CJ and CR abilities should therefore considerably increase students' independence in CJ when assessing a patient's condition to identify significant cues. This ability can be emphasized by the CI at the beginning of the clinical rotation when students are engaged in direct patient care and during the debriefing post-conference at the end of the clinical day when students reflect on patients' conditions—which are relevant to the concepts of the concept-based learning strategy. The impact of student discussions at the post-conference will be extended to solidify the “narrative-reflective” reasoning pattern (Alfayoumi, 2017) that was previously identified by Tanner (2006) as the “narrative” reasoning pattern. Students will reflect on their performances when listening to other students' stories (Alfayoumi, 2017).

With a shift in the focus of both the structure and progression of the clinical day, faculty members will have more time to guide students' thinking towards the subtleties of what students see and how these observations are connected with both the attained concepts and the mental maps structured in the classroom (Nielsen, 2009). Transformation of knowledge occurs through either active external experimentation (extension) or internal reflection of the experience (Lisko and O'Dell, 2010). Structured debate in the clinical post-conferences, mediated by the CI, will create an opportunity for students to explore various care perspectives in decision-making on issues relevant to core concepts of nursing care (de Menezes et al., 2015). These efforts will subsequently impact students' general CR behavior that include contextual and communication aspects with patients. Moreover, the attained experiential knowledge will sharpen the mental criteria upon which new patient conditions are assessed and cared for. This transfer of learning is known to be a major dilemma facing nursing students (Mann, 2012) and is one that can be mediated by adopting the previous instructional strategies.

Developing students' intuitive reasoning abilities can be an additional gain linked with concept based learning activities (Schoessler

et al., 2012). The mental chunks or criteria will constitute background knowledge necessary for pattern recognition (Schoessler et al., 2012). The intuitive reasoning pattern was defined by Alfayoumi (2017) as the sudden recognition of the whole display of a pattern or a gap in a pattern that will trigger an analytical or a narrative-reflective reasoning pattern to make a relevant CJ. The results of this study showed insignificant but progressive improvements in students' intuitive, analytical, and reflective reasoning patterns, incorporated into the General CR Behavior Scale, as perceived by students. These improvements indicated minor impact for the combined pedagogies on students' reasoning patterns. Significant improvement in these patterns might be evident at the end of the program with senior students.

5. Conclusion

Twenty-seven years ago Heims and Boyd (1990) urged researchers to investigate the outcomes of concept-based learning activities, especially teaching-learning processes and its efficacy in teaching nursing practice. This study is contributing to that recommendation by documenting the impact of the blended teaching strategies of concept-based learning and concept-mapping to enhance students' CR and CJ abilities.

This study documents enhancement in students' independence in CR and CJ as a result of learning to take command of the elements of their CR. This element can be sharpened by utilizing the data collection tools used in this study as clinical teaching aides, hence, maximizing the impact of the blended teaching approaches by providing the faculty with specific feedback regarding students' independence in CR and CJ, in addition to their contextual CR behavior.

The reciprocal relationship between the blended teaching strategies of concept-based learning and concept-mapping and the data collection tools need to be institutionalized by initiating relevant policies and guidelines. This needs to be tested in large scale research in the future. Student performance, as well as relevant clinical instructor's feedback, will help students to take command of their CR, mature, and be responsible in a practice area that is constantly changing and evolving. Finally, future research in this area need to overcome the inadequacies of the adopted pretest-posttest design by including a control group with larger samples to document the progressive impact of using the blended pedagogies on students' CR patterns.

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Nadeen Ghabaen, MSN: Preparing the background information related to some of the concepts and participated in data collection.

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