Building evidence for the development of clinical reasoning using a rating tool with the Outcome-Present State-Test (OPT) Model

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Abstract:

As nurses strive to adopt evidence-based practice, those who teach nursing must provide evidence of student learning, both in class and in clinical practicums. The purpose of this study was to describe the use of a tool to rate students' work in medical-surgical clinical practicums using the Outcome-Present State-Test (OPT) Model of clinical reasoning. The OPT model is a third generation nursing process meta-model designed to assist students in planning and evaluating their nursing care. A sample of 48 students enrolled in a medical-surgical course completed a total of 405 OPT models and Clinical Reasoning Webs, which were re-rated after the students had completed clinical experiences in the course using a new rating tool developed for this study. The rating tool was useful for rating students' work and noting their development of clinical reasoning skills; however, it needs further refinement and testing. Suggestions are included for faculty members who wish to develop tools for evaluating students' clinical reasoning.

Keywords: Outcome-Present State-Test Model | Clinical Reasoning | Nursing Students | Evaluating students work

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ABSTRACT

As nurses strive to adopt evidence-based practice, those who teach nursing must provide evidence of student learning, both in class and in clinical practicums. The purpose of this study was to describe the use of a tool to rate students' work in medical-surgical clinical practicums using the Outcome-Present State-Test (OPT) Model of clinical reasoning. The OPT model is a third generation nursing process meta-model designed to assist students in planning and evaluating their nursing

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Assisting students to develop clinical competence requires faculty members to teach students to reason through clinical problems, and to plan, implement and evaluate the care they give. However, evidence of the effectiveness of strategies to teach clinical reasoning to students is lacking. Nursing students in our programs spend countless hours each week before, during and after clinical experiences completing care plans, care maps, concept maps, interpersonal process recordings (IPRs), and now the Outcome-Present State-Test (OPT) Model worksheets. Yet there are no reliable and valid tools for faculty members to use in evaluating students' clinical reasoning. The purpose of this study was to describe the use of a tool to quantify 48 students' ability to complete a total of 405 OPT model worksheets while caring for patients in their medical-surgical practicum's.

The Outcome-Present State-Test (OPT) Model of Clinical Reasoning

The theoretical framework for this descriptive study is Pesut and Herman's[1] OPT model. The OPT Model is a third generation nursing process meta-model designed to assist students in planning and evaluating care. Pesut and Herman based the model on Bandura's[2] self-efficacy learning theory that students ability for problem solving improves if they see that their actions bring about desired outcomes in the patients they care for. Students' ability to clinically reason improves as they focus on understanding how nursing diagnoses, nursing actions, and making judgments about the care they provided help move the patient from their current state to a desired outcome state.[1] In previous research conducted by the authors, baccalaureate nursing students have demonstrated clinical reasoning abilities using the OPT model.[3-7]

Students complete a clinical reasoning web and OPT model worksheets to elucidate their thinking and clinical reasoning. The first step in the process is completing the clinical reasoning web (Figure 1) and discovering the keystone issue, or priority nursing diagnosis for a patient. Students start by placing the

patient's major problem or medical diagnosis in the center of the web. Then they identify all potential and real nursing diagnoses based on the patient's history and clinical manifestations, and enter the diagnoses and supporting data in the circles around the web. Next, they connect related diagnoses with arrows, a key component of clinical reasoning since this helps students see how one problem is related to another. The arrows cross over each other to form a "network of lines"; thus it is called a clinical reasoning "web." The nursing diagnosis that has the most arrows pointing towards it and away from it is the keystone issue. The assumption is that resolving the keystone issue will facilitate resolution of related nursing diagnoses. For example, in the sample web in Figure 1, "pain" is the keystone issue, and treating the patient's pain will likely also resolve the patient's activity intolerance, weakness, fatigue, and nausea.

After choosing a keystone issue, students complete the OPT model worksheets. Students first complete the "client in context" story, and from the story identify clinical manifestations that support the keystone issue: desired, measurable, time-sensitive outcome statements that reflect either maintenance or improvement of the clinical manifestations, and tests/assessments that can be used to evaluate the patient's progress towards the outcomes. After providing care, students make judgments about the patient's progress towards the outcomes and the effectiveness of the interventions and appropriateness of tests/assessments in documenting patient progress. Students also "frame" the overall patient situation by labeling the context of the patient's situation. The frame determines the lens through which outcomes and interventions are chosen. A sample OPT model to accompany the web in Figure 1 is shown in Figure 2.

***Completing the decision making/interventions worksheet* .**

The next step in the clinical reasoning process is identifying patient specific interventions that will assist in resolving the keystone issue and achieving desired outcomes. Students are required to reference their interventions since this is key in assuring that evidence-based interventions are chosen. The interventions worksheet that students create to accompany the web and OPT model worksheet is shown in Figure 3.

We have presented the process of completing the web and OPT model worksheet as a linear process; however, the process is recursive as students jump back and forth between completing the web, reflecting on choices of outcomes and interventions and actually filling in the form at different points. They may start from the left side (the judgments section) after finishing a clinical experience, and then move backwards across the model (to the right).

The Rating Tool

In 2002-2003, we evaluated student OPT model worksheets using a tool that rated each major section of the model as either “evident” or “not evident.” These groups of students were enrolled in a medical-surgical clinical rotation, and their clinical work was collected each week, rated, and returned to them with feedback on how well they had completed the model and related all the sections. When the clinical reasoning web, interventions, and OPT model worksheet were combined, there were a total of 12 separate “sections,” so scores on each week’s work could range from 0 to 12. The data from the ratings were analyzed using cross-tabs with a Chi square test. Analysis of scores from this sample of 23 junior baccalaureate nursing students did not show any differences between students or any differences in their work from week to week.[3] Because the researchers had familiarity with these students as clinical instructors, we remembered that some students’ work did improve over the semester. It was clear that the OPT model rating tool was not sensitive enough to detect variability between students or over time. The tool was revised to rate each section of the Web and OPT model worksheets, and the relationships between sections, and, where appropriate, to rate responses where students include more statements, with more points. Figure 4 illustrates the tool and the possible points for each section. Figure 5 shows portions of the ratings of the sample Web and OPT model illustrated in Figures 1, 2, & 3, with comments on how the student received lower ratings on certain sections.

The revised tool rates five different sections of the clinical reasoning web, including the number of nursing diagnoses, the inclusion of supporting data, the number of connections between diagnoses, relationship of the connections to the keystone issue, the relationship of the diagnoses to the admitting problem, and the diagnoses’ representation of at least three of five domains -- physiological, behavioral, safety, family, heath system, and community. These five domains are included in the taxonomy of Nursing Intervention Classifications (NIC).[8] The current tool now rates 17 different sections of the OPT model.

A key aspect of the tool is that the sections of the OPT model must relate to other sections. Thus, the present and outcome states must relate to the keystone. The outcome state must reflect improvement of the present state. More points are awarded when the student lists more interventions, more outcomes, and more judgments. Thus for the section requiring that a student list 5 related interventions, a student who lists only “1” appropriate intervention, receives only “1” point for that section; if there are “5” appropriate interventions, then that section receives “5” points. The rating tool now has a possible score of 74 points. This tool is a work in progress. Faculty members wishing to use the rating tool are encouraged to adapt the tool as needed to meet their needs. Different versions of this tool have previously been published by Kuiper[5] and Bartlett et al.[8]

Methods

This descriptive study was approved by the institution's IRB, and 48 students who gave us consent to use their OPT model worksheets were used in this research. One researcher used the tool to re-rate the 405 OPT model worksheets and clinical reasoning webs that the students completed in their adult health (medical-surgical) clinical practicum. The 48 students included 23 students in the fall semester and 25 students in the spring semester. The fall semester students were all generic BSN students, while the spring sample included 8 generic BSN students, and 17 paramedic to BSN students. Table 1 is a summary of some of the demographics of the fall and spring semester students. Note that the fall semester group included only 3 students (ages 20, 21, and 21) who would be considered "traditional" junior students. All of the other 45 students were older, and the majority of students in all three groups were working. We believed that there would be differences in the groups of students because the paramedic to BSN students had no experience caring for patients in the hospital, were in only their second semester as nursing students, but had been practicing for several years as paramedics, had previous degrees, and were carrying much higher course loads, and were working more hours each week. The generic BSN students were all Certified Nursing Assistants (CNAs), were in the 4th or 5th semester as nursing students, had much more experience completing nursing care plans, were used to caring for hospitalized patients, were more acculturated to nursing, and were working less hours and taking fewer courses. Also, in the fall semester, three of the researchers taught the medical-surgical course and gave students feedback each week on their OPT models and clinical reasoning webs. In the spring semester, only one of the authors taught the course, and students rarely got feedback. We anticipated that differences in the paramedic to BSN and generic BSN students, and differences in amount of feedback students got during the semester on their OPT models, would account for a great deal of the variability in students' scores using the tool.

Results

Split-plot repeated measures analyses of variance (ANOVA) were used to examine differences in average scores across time, between students, between semesters and, for the spring semester, between generic BSN and paramedic to BSN students. Analyses were conducted on total scores as well as component scores for judgments as well as present state/outcome statements.

The analysis of total scores found statistically significant differences between weeks (p=0.04), with the difference from Week 1 and 2 representing the key change. There were also significant differences between students (p<0.001); however, there were no differences in average scores between the two semesters (p=0.80) and the pattern of scores over time between the two semesters did not differ (p=0.40). There were no differences in generic BSN and paramedic to BSN students in the spring semester.

While the difference in students' work from Week 1 of the clinical experience in which an OPT model was completed to Week 2 was the key change (p = 0.04), overall scores generally continued to increase after Week 2, and then approach a plateau. This change was due primarily to the "judgments" section of the OPT model, because of the greater specification by the students on this section on the tool. Students' judgments were required to reflect their interventions, tests and outcomes as illustrated in the graph of estimated weekly scores in Figure 6. Analysis of the judgments alone yielded similar results for the differences over time as well as between students. An analysis of relationships between present state and outcome state yielded different conclusions. There were no differences in weeks overall (p=0.90) but large differences in between students (p<0.001). There were also differences in average scores between the two semesters (p=0.01), with the spring semester about 1.8 points higher on average), and the pattern of scores over time also differed between the two semesters (p=0.04). Because of this, further analyses were conducted for each semester separately. In fall, there was no difference over time in the scores observed (p=0.62); in spring, there was a difference over time in the scores observed (p=0.03) with a general downward trend especially from the start. We attribute this general downward trend to decreased student effort toward the end of the course. In both semesters there was a large difference (p<0.001) between individual subjects. There were no differences between generic BSN and paramedic to BSN students in the spring semester (p=0.89).

Conclusions and Implications

Rating these students' work showed some ability of the tool to uncover differences between students, and to differentiate a student's work from one week to the next. Faculty members were able to see improvement in students' clinical reasoning however, most of this improvement was from the first to the second week, and detecting change only from the first to second week is disappointing. We were also surprised that there was no difference between the paramedic-to-BSN students and the generic students, and there was no difference between the students in the fall semester, who received feedback each week, and the spring semester, when they did not receive feedback. There are three potential explanations for these findings, all of which are limitations of the study findings. First, the analysis was retrospective; students were not given feedback using the rating tool, and thus would not have known they needed to improve. The only feedback that both the fall and spring students received was on the "evident" and "not evident" categories. Feedback using the third version of the tool would have given the students specific information on how to improve. Further, by focusing primarily on the quantity of students' responses and the inter-relatedness of one section to another, the tool does not measure very high level clinical reasoning skills. These would have to be evaluated by examining the judgment column qualitatively, looking at embedded critical thinking skills. A third explanation is that once students are able to complete the model, they do not improve further with or without feedback from faculty members. The question

is, if they learn how to complete their clinical paper work assignment in the first or second week of a clinical practicum, what value does continued paper work assignments have? If we do not have tools that show continued progression of our students' reasoning throughout their clinical practicum experience, how can faculty justify asking them to continue to complete these types of clinical assignments throughout a practicum experience?

The primary benefit of using a rating tool like the OPT rating tool to evaluate students' clinical assignments may be that faculty members can make their expectations explicit to students. Bartlett, et al[7] found this when using the rating tool with a group of students in a psychiatric clinical practicum. After rating the student's work with the tool and giving specific feedback each week, faculty found that students quickly mastered the model.

Using a tool such as this also makes it clear to students how their work will be evaluated, and students have opportunities for self-correction and self-monitoring by observing their strengths and areas for potential improvement. Another potential benefit from using a tool to rate students' clinical written assignments is that their work is consistently evaluated regardless of the number of faculty members they have over the course of a semester, or the complexity of the patients they care for.

We found some of the same issues in rating these students work as we have previously reported when working with other students in other settings.[7] Counting the numbers of items in each section of the tool encourages faculty members to focus on individual components of the student's work, but there may be a tendency to lose sight of the overall clinical situation of a patient. That is to say, with a focus on the "quantity" of a student's responses, there is a loss of focus on the "quality" of those responses. Thus, faculty members who used OPT model worksheets should have students complete them during and immediately after clinical experience to ensure that they stay focused on the issues that are priorities for their patients. Students can also conduct peer reviews of each other's work, especially when they are working together to care for a specific patient or group of patients.

We recommend regular reviews and discussions of the OPT applications and comparison of individual and group ratings to ensure consistency. In our study, all 405 models were rated retrospectively by one of the researchers who noted that his ratings likely varied due to the tedium of the rating process. We did not conduct any tests of inter-rater or intra-rater reliability. These are limitations of our study. Regular reviews and discussions among faculty members would allow further refinement of rating skills, discussion about how aspects of the model are rated, and consistency in student feedback. Bartlett et al.[7] found that regular meetings between faculty members to discuss and compare ratings led to faculty achieving scores of within 3 to 4 points of each other when rating the same student's work. The authors have heard complaints from nursing students that

faculty are often inconsistent when evaluating their clinical work, and regular meetings to compare ratings would likely solve this problem.

Another limitation of our study is that we only measured student's reasoning ability using the OPT model worksheets. Our assumption is that measuring the student's ability to complete the OPT model worksheets is a valid method of measuring clinical reasoning. Future studies need to include the use of other concurrent measures of clinical reasoning as well as comparing their reasoning abilities with their theory grades in the course.[3,4,6,7]

The tool is not intended to be used for clinical grade determination. Written reflections on clinical practice are only a portion of evaluation. All students should progress to higher levels of clinical reasoning as they move through a program, but the rate at which this happens is individually determined. In order to evaluate the OPT model as a measure of clinical reasoning, we recommend that faculty members compare OPT model ratings with other measures of clinical reasoning. Using more than one measure of clinical reasoning will provide better understanding of how each student performs and what is actually measured. Reliable and valid measures of clinical reasoning abilities will enable faculty members to track progress and identify strengths and weaknesses for remediation of students.

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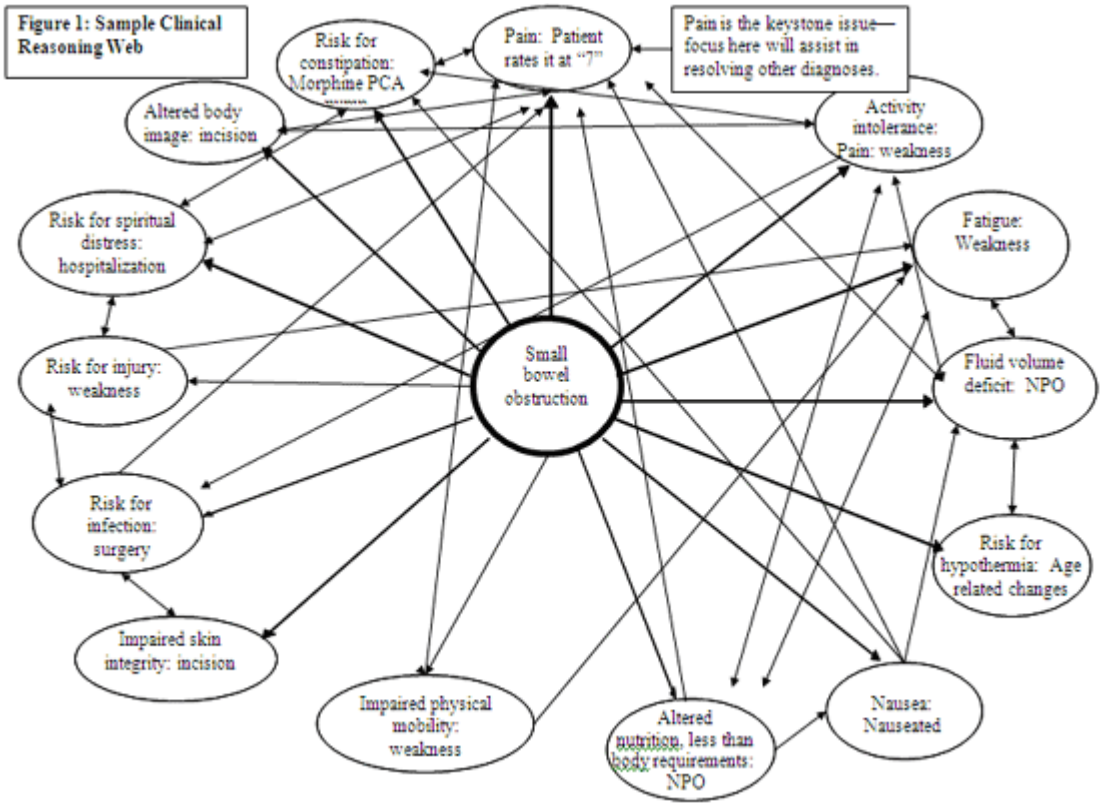

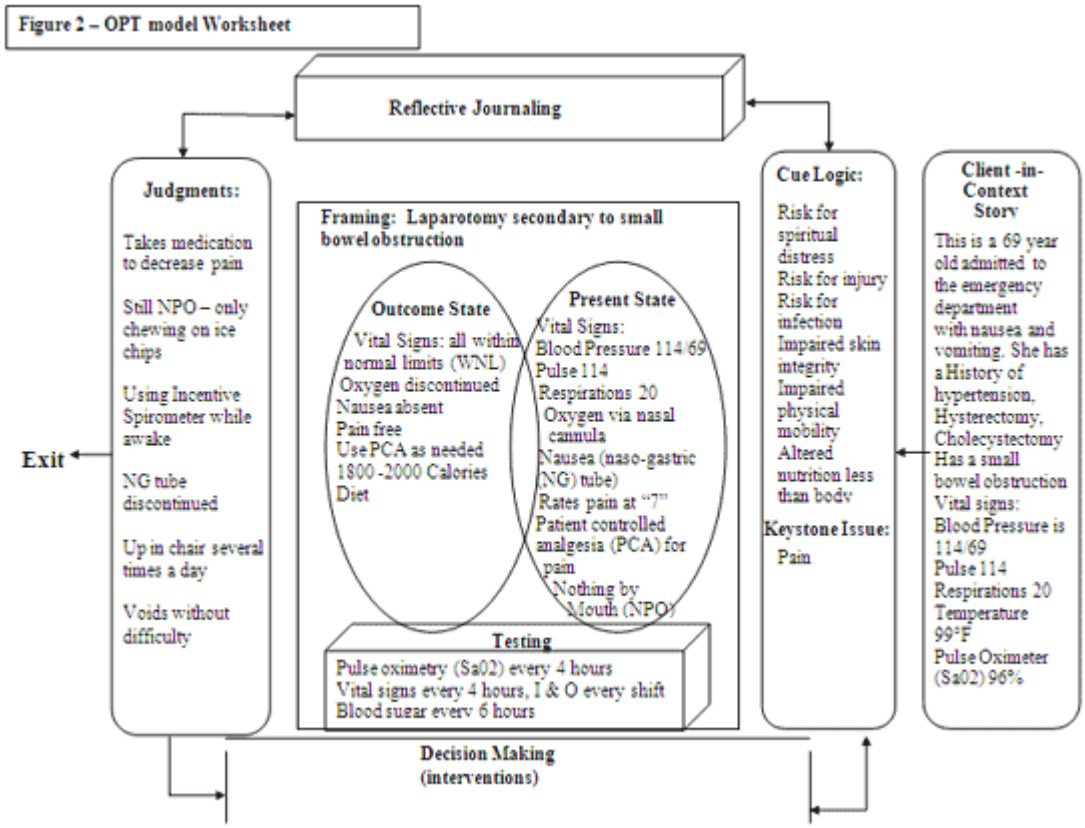

Figure 3: Decision Making (Interventions)

Keystone Issue: Pain (Related to small bowel obstruction)

Decision Making (Interventions) Rationale

1. Assess pain level
2. Wound care every 12 hours
3. Spirometry every hour while awake
4. Monitor pulse oximetry every 4 hours
5. Monitor bowel movements every shift
6. Encourage regular ambulation as tolerated
7. Maintain adequate level of hydration and nutrition
8. Administer pain medication PRN

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(Students were required to cite their reference for the interventions chosen.)

Figure 4 – Rating tool with 74 points

Portion of Clinical Reasoning Web being rated	Potential Score
5 – 9 NANDA-I Nursing Diagnoses (5 Nursing Diagnosis=1, 6 Nursing Diagnoses=2)…. (9 Diagnoses or more = 5)	5
5 – 9 Nursing Diagnoses have supporting data (5 Nursing Diagnoses have supporting data = 1) (9 have supporting data =5)	5
10 – 18 connections between Nursing Diagnoses (10=1, 12=2, 14=3..18=5))	5
Connections lead to Keystone Issue	1
NANDA-I Nursing Diagnoses related to admitting problem or medical diagnoses	1
NANDA-I Nursing Diagnoses represent at least 3 domains (1 point for each domain) physiologic, safety behavioral/psychosocial family, or community	3
Portion of OPT MODEL being rated	
Client in context (CIC) story includes admitting problem or diagnosis	1
CIC story includes assessment history	1
CIC story includes clinical manifestations	1
CIC story includes Lab Data or “No lab data”	1
CIC story includes social/family history	1
Keystone is NANDA-I Nursing Diagnosis	1
5 present state statements related to Keystone (1 point each)	5
5 Outcome state statements reflect improvement from or maintenance of Present State (1 point each)	5
5 Outcome state statements related to Keystone (1 point each)	5
5 Interventions related to Keystone (1 point each)	5
Interventions are referenced	1
5 Tests related to Outcomes (1 point each)	5

Judgments include 5 statements (1 point each)	5
Judgments include 5 statements which reflect TESTS (1 point each)	5
Judgments include 5 statements which reflect INTERVENTIONS and reflect the KEYSTONE ISSUE (1 point each)	5
Judgments include 5 statements which reflect OUTCOMES and reflect the KEYSTONE ISSUE (1 point each)	5
Frame reflects 2 domains (1 point each)	2
Total score	74

NOTE: This tool is a work in progress and was originally developed by two of the authors, Kautz and Kuiper. This tool has been previously published in articles by Kuiper, 2008 and Bartlett et al. 2008. The authors suggest that faculty adapt it to meet their particular needs.

Figure 5 – This table shows portions of the tool where the student's work depicted in Figures 1, 2 & 3 lost points, the rationale for the lower score, and suggestions to improve the students work.

WEB				
Portion of the OPT Model being rated	Possible Score	Score on this student's work	Rationale for lower score	Suggestions to improve student's work
CIC story includes social/family history	1	0	Student omitted social/family history	"Patient lives alone in apartment in the city"
5 Interventions related to Keystone	5	2	Only 2 interventions relate to pain	Additional NIC activities which are relevant to this patient: "Medicate prior to ambulation"

				“Promote rest and sleep to facilitate relief of pain” “Monitor effectiveness of PCA”
5 Tests related to Outcomes	5	2	None of the tests relate to pain management – only 2 relate to vital signs monitoring	Additional tests (NOC indicators) related to pain: “Rate pain every 2 hours” “Describe pain every 2 hours” “Monitor effectiveness of PCA pump every 2 hours.”
Judgments include 5 statements which reflect TESTS	5	1	Only 1 of the judgments “Spirometer” relates to the test “Sa02” –	The follow 3 judgments all relate to “pain” and the revised TESTS listed above. “Rates pain as 3” “Describes pain as “dull” “Is using PCA effectively for pain relief.” Additional judgements

				which relate to the NOC “Pain level” would include vital signs measurement
Frame reflects 2 domains	2	1	Reflects only physiological domain	A better frame would be: “Patient recovering from emergency laparotomy – will be able to return home when eating and able to perform self-care activities.”

Figure 6.

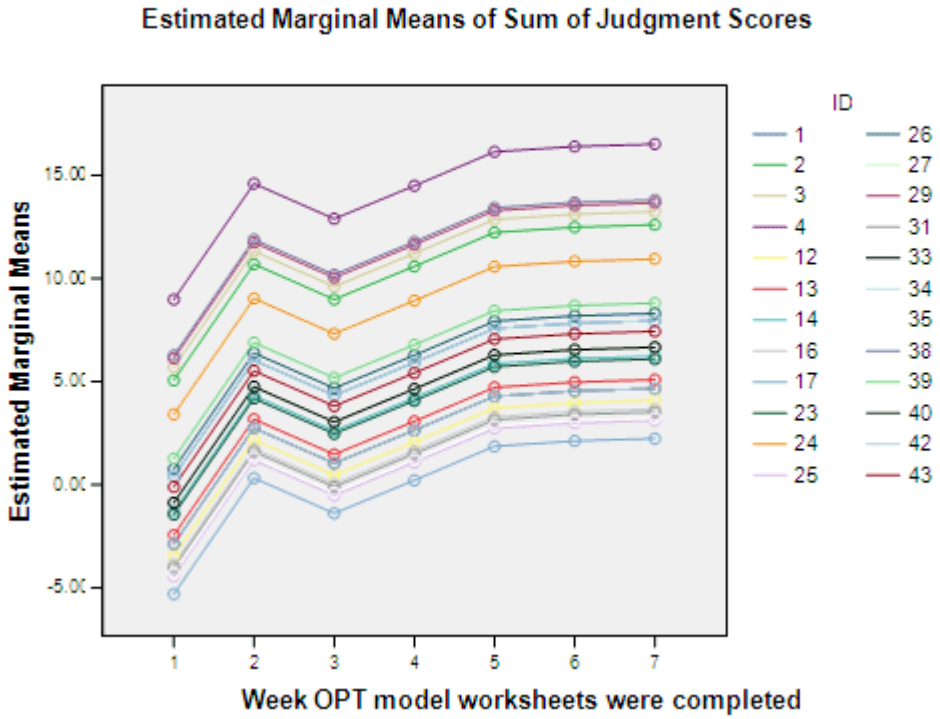

Figure 6 illustrates students ability to complete the “judgments” portion of the OPT model worksheets in successive weeks through the semester. Although individual time patterns were not identical, the ANOVA indicated a high degree of parallelism in these patterns. This figure of the average profile over time adjusted for an individual student's average score illustrates that the tool was able to detect the differences in individual student's abilities to make "judgments" over

time as well as the differences between students. The figure graphically illustrates that the main improvement students' made was from the 1st to 2nd week.

Table 1 – Characteristics of the Sample

	Fall Total *N*=23	Spring Paramedic to BSN *N*=17	Spring Generic BSN *N*=8
Gender			
Male (n)	2	7	0
Female(n)	21	10	8
Ethnicity			
African-American (n)	14	0	7
White-Non-Hispanic (n)	7	16	1
Asian (n)	0	1	0
Age (years)			
Mean (Range)	26.5 (20-44)	31.25 (24-52)	27 (23-38)
Previous Degree			
Associate Degree (n)	2	17	2
BS/BA (n)	4	5	2
MA – Education (n)	1		
Certification			
CAN (n)	19	0	8
Paramedic (EMT-P) (n)	0	17	0
Years experience in Health Care			
Mean (Range)	3.3 (0-20)	7.7 (0-15)	2.75 (0-7)
Hours Employment each Week			
Mean (Range)	14 (0-40)	56.86 (26-78)	11 (0-40)
Course Load			
Mean (Range)	12 (10-15)	19.8 (15-31)	12.5 (12-15)