Adapting Exam Wrappers to a Prescription Rubric in a One-semester Skills Lab Course

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BACKGROUND

Exam wrappers are a commonly used student self-reflection tool implemented by many universities[1–4]. The format of the wrappers are: (1) ask students to reflect on their preparation for the exam, (2) consider the source(s) of error during the exam, and (3) develop a plan for improvement for future exams.[5] This practice incorporates exam(s) into the learning process.

In a first-year Fall Skills Lab course, students prepare 9 prescriptions which are assessed using a rubric evaluating four categories: product, label, calculations, and legal components of the prescription. The rubric assigns the grade of pharmacist (P), student pharmacist (SP), or unsatisfactory (U) based on performance across each category. The unsatisfactory grade is assigned if the prescription has major legal errors or is potentially harmful to the patient. The student pharmacist grade is assigned when there are minor errors in the prescription that are not harmful to the patient. The pharmacist grade is assigned when there are no errors in the prescription.

Prescription Wrappers were created to assist students in reflecting on their preparation, performance, and how to improve on future prescriptions.

OBJECTIVE

1. Apply the exam wrapper concept to prescription assessments to increase student self-reflection.
2. Assess the relationship between prescription grade and preparation time, student confidence, and preparation activities.

METHODS

Evaluate Prescription Rubric → **Adapt Exam Wrappers Core Concepts** → **Implement with first prescription assessment**

Evaluated current Prescription rubric (Figure 1) to identify how students are being assessed on content knowledge.

Applied the Exam Wrapper's concepts of preparation, performance, and future plans to the Prescription Assessment.

Presented students (n=120) with the Prescription Wrappers (Figure 2) when they received their grades and feedback on their first prescription. Students were given 1 week to complete and return.

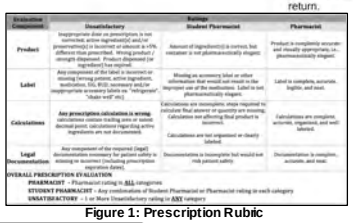

Figure 1: Prescription Rubric

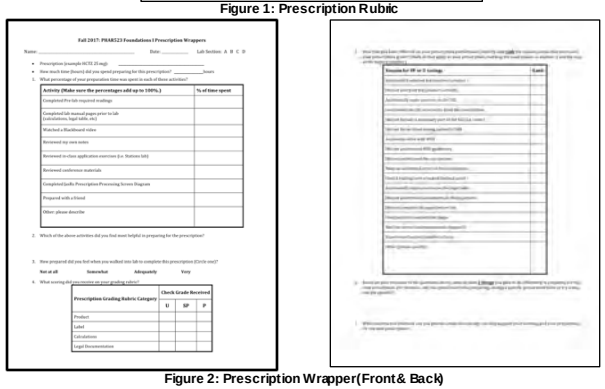

Figure 2: Prescription Wrapper (Front & Back)

STATISTICAL METHODS

Students were grouped based on performance into either:

- U (unsatisfactory)
- SP/P (student pharmacist or pharmacist)

Table 1: Statistical Tests Performed for Each Objective Measure

Objective Measure	Statistical Test
Differences in mean number of preparation hours	Equal variance two sample t-test
Differences in mean time spent in each study method	Equal variance two sample t-test
Student self-reported Preparedness	Homogeneity test
Factors associated with student performance	Multiple Logistic Regression

RESULTS

Of the **120 students** who completed exam wrappers, **81 (67.5%)** obtained an unsatisfactory (U) grade, **26 (21.7%)** were graded as having student pharmacist (SP) proficiency, and **13 (10.8%)** had pharmacist (P) proficiency.

Bivariate Analysis

No significant differences in the total number of hours of preparation and the number of hours allocated to each study method were found between students who scored U and those who scored SP/P (Table 2).

Table 2: Student Self-reported Mean Number of Hours and Study Method Used for the Prescription

Type of Preparation	Unsatisfactory (U) Mean (SD) hours	Student Pharmacist/Pharmacist (SP/P) Mean (SD) hours	p-value
TOTAL number of hours	1.9 (0.98)	2.1 (1.12)	0.4826
Completed Pre-lab Readings	0.5 (0.41)	0.5 (0.52)	0.6794
Completed lab manual pages prior to lab	0.3 (0.27)	0.3 (0.19)	0.5767
Watched a Blackboard Video	0.3 (0.39)	0.5 (0.42)	0.1655
Reviewed my own notes	0.2 (0.19)	0.2 (0.16)	0.8769
Reviewed in-class exercise	0.2 (0.21)	0.2 (0.28)	0.7576
Reviewed conference material	0.2 (0.45)	0.1 (0.15)	0.3473
Completed JasRx Prescription Processing Screen Diagram	0.1 (0.21)	0.1 (0.22)	0.5436
Prepared with a friend	0.1 (0.14)	0.1 (0.21)	0.5489

Significant differences (chi-square=16.8, p=0.0002) between the two groups were found across levels of self-reported preparedness (Table 3).

Table 3: Student Self-reported Level of Preparedness

	U	SP/P	Total
Not at all/Somewhat	30 96.8%	1 3.2%	31
Adequately	35 60.3%	23 39.7%	58
Very	15 51.7%	14 48.3%	29
Total	80	38	118

Multiple Logistic Regression Analysis

A **significant positive association** between student self-reported preparedness and prescription grade was identified. Students who felt **adequately or very prepared** were respectively **23 and 36 times more likely to have a grade of SP/P in the prescription** compared with students who self-reported being not at all/somewhat prepared (Table 4).

RESULTS

Table 4: Adjusted Multiple Logistic Regression Model Assessing the Relationship Between Time Spent in Different Study Methods, Self-reported Level of Preparedness, and Prescription Grade

Model parameter	Estimate	SE	p-value	95% CI	OR	OR 95% CI
Preparedness						
Not at all/somewhat (ref)	--	--	--	--	--	--
Adequately	0.90	0.42	**0.031***	0.08-1.72	**23.22**	2.75-196.37
Very	1.34	0.46	**0.003***	0.44-2.24	**36.15**	3.89-335.93
Hours of preparation	1.27	1.14	0.27	-0.97-3.50	--	--
Completed Pre-lab Readings	-1.68	1.36	0.22	-4.36-0.99	--	--
Completed lab manual pages prior to lab	-2.22	1.61	0.17	-5.38-0.93	--	--
Watched a Blackboard Video	-0.71	1.29	0.58	-3.23-1.81	--	--
Reviewed my own notes	-1.06	1.80	0.56	-4.59-2.48	--	--
Reviewed in-class exercise	-0.70	1.51	0.64	-3.67-2.26	--	--
Reviewed conference material	-2.15	1.90	0.26	-5.87-1.57	--	--
Completed JasRx Prescription Processing Screen Diagram	-1.26	1.55	0.42	-4.31-1.78	--	--
Prepared with a friend	0.89	1.89	0.64	-2.83-4.60	--	--

* statistical significance at p<0.05

DISCUSSION/CONCLUSION

- The Exam Wrapper concept was applied to the prescription assessments as the Prescription Wrapper to increase student self-reflection (Objective 1).
- Number of hours and methods of preparation did not demonstrate an impact on performance. Student's self-reported level of preparedness was associated with higher performance (Objective 2).
- The finding that number of hours and method of preparation did not improve performance was unexpected. This calls for additional study into what may be a predictor for student success.
- An analysis of the causes for errors and how that may relate to the students' level of preparedness could help explain why self-reported preparedness was a predictor for success but hours and method of preparation were not. If students are more likely to make an error due to anxiety versus content knowledge, this may change how we teach students to avoid dispensing errors.
- The Prescription Wrappers will be continued in following semesters to increase student self-reflection and to find additional predictors of student success.
- These findings may indicate a need for a larger discussion of why dispensing errors occur in practice and how we can better train students to avoid them as practitioners.

LIMITATIONS

- This study only focused on the first of nine prescriptions filled by the students.
- There were students (n=8) who either incorrectly filled out the exam wrapper or only partially filled it out, thus their data was not included.
- Only one group of students was included which limits generalizability of the findings.
- Students completed the wrapper after receiving their prescription grade, which could impact their responses.
- Prior community pharmacy experience was not collected but could impact performance and student preparation needs.

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