INSTRUCTIONAL DESIGN AND ASSESSMENT

The Effect of Reflective Activities on Reflective Thinking Ability in an Undergraduate Pharmacy Curriculum

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Objective. To determine the effectiveness of integrating reflective practice activities into a second-year undergraduate pharmacy curriculum and their impact on reflective thinking ability.

Design. A cross-over design with repeated measures was employed. Newly developed reflective modules based on real hospital and community pharmacy cases were integrated into the second-year pharmacy practice curriculum. A novel strategy, the Reflective Ability Clinical Assessment (RACA), was introduced to enhance self- and peer reflection.

Assessment. Student responses (n=214) to the adapted Kember et al¹ Reflective Thinking Questionnaire (RTQ) were compared before and after reflective activities were undertaken. Significant improvement in three indicators of reflective thinking was shown after students engaged in reflective activities.

Conclusion. Integration of reflective activities into a pharmacy curriculum increased the reflective thinking capacity of students. Enhancing reflective thinking ability may help students make better informed decisions and clinical judgments, thus improving future practice.

Keywords: pharmacy curriculum, reflective practice, reflective thinking, experimental crossover design, pharmacy teaching

INTRODUCTION

Reflective thinking and learning capacity is regarded as an essential attribute in the health professions to link theory with application and to address the challenges that arise in clinical practice.²⁻⁸ However, evidence to support the integration of these skills and curricular innovations in health education remains largely theoretical.² Furthermore, evidence of integration of reflective practice teaching and learning modules into curriculum is scant.

Reflective practice is an umbrella term used to describe the professional strategy to constantly improve one's practice.⁵ It is a cognitive process of understanding and evaluating the meaning of an experience within the context of one's previous experience, previous and existing knowledge, firmly held beliefs, and assumptions.^{9,10} Through reflective practice, professionals continue to critique their skills, performance, outcomes, and behavior. It can be argued that constant critiquing of practice, upgrading skills and performance, and/or changing behavior,

allows for better informed decisions and clinical judgments,¹¹ thus enabling improvement for future practice.^{5,6,12,13}

Integrating reflective practices into health education settings can enhance self-reflection⁶ and fundamental reflective thinking ability.¹⁴ Integrating reflective learning activities may also assist with bridging pharmaceutical theory to the complexities of pharmacy practice.^{5,13} Furthermore, enhancing reflective thinking and reflective learning improves lifelong learning skills¹⁵ such as critical thinking,^{16,17} problem solving,¹⁸⁻²⁰ clinical reasoning and decision making,^{11,16} communication skills,^{21,22} self-directed learning, and professional development.^{7,10,23-32} Subsequently, enhanced reflective thinking skills may better prepare students for the challenges that may arise in future clinical practice.

Moreover, adopting reflective learning and thinking skills may enhance deep learning and develop metacognitive ability.²¹ Enhancing metacognitive ability of pharmacy students can assist with improving the application of theory to resolve issues they may encounter in future clinical practice.^{21,33,34} Therefore, incorporating these fundamental skills into pharmacy curriculum may be a sound teaching methodology.

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Several scholars posit that structured reflective guides or prompts are a useful tool to enhance reflective processes^{6,35} and promote the strategies for continuous professional development,³¹ better clinical decisions and improvement of clinical practice.^{6,11,36,37} Some researchers believe that the art of reflection is a skill that can be taught without any prerequisites of knowledge in this area as long as the learning environment is conducive for reflective activities.^{10,38} Integrating learning and teaching modules into an undergraduate pharmacy curriculum to enhance such a fundamental skill has the potential to assist the pharmacy student to become prepared for the real world of pharmacy practice.

Several tools enhance reflective capacity. For example, reflective writing as a tool to enhance reflective capacity is at the forefront of the published literature.³⁹ Reflective writing tools such as statements,^{40,41} essays,^{42,43} diaries,^{44,45} logbooks,⁴⁶ portfolios⁴⁷⁻⁵⁴ and journals⁵⁵⁻⁵⁹ have been used to enhance the reflective thinking process. Extended from these are the more technologically oriented online versions such as e-portfolios,⁶⁰⁻⁶⁸ e-journals, and blogs.^{17,69-71} Such tools enhance professional continuing education to allow a continuous critiquing of skills in practice.^{15,72} Furthermore, reflective exchange blogs (REB) have been considered for effective exchange of reflective dialogue between multidisciplinary health team members.⁵ To assess the depth and level of reflection, tone can draw from the theories and ideas of early researchers and leaders in the field of reflective practice: Dewey,⁷³ Polanyi,⁷⁴ Kolb,⁷⁵ Schon,^{3,4} Boud,⁷⁶ Mezirow^{77,78} and Moon.⁸ We wrote a timeline of the key educators of reflection as a guide to understanding the development of reflective practice since the 1900s.⁵

Integration of reflective activities into an undergraduate pharmacy curriculum included a suite of reflective tasks, the primary one consisting of media and written tools: video podcasts (to enhance self and peer reflection) and a written task in the form of a reflective statement. Videos are an effective tool in health professions education to enhance communication skills and self and/or peer reflection.⁷⁹⁻⁸³ Video podcasts may be a useful way for students to improve their counseling and clinical competency skills by reflecting on their own counseling shortcomings, as well as their strengths and those of a peer. Moreover, addressing their inner thoughts about and challenges from the whole task (including the video task) through reflective writing allows students to develop strategies to overcome barriers and concerns to improve future tasks.^{22,84} The objective of this study was to determine the effectiveness of integrating reflective practice activities into a second-year undergraduate pharmacy curriculum and to evaluate its impact on reflective thinking ability.

DESIGN

In 2014, a novel design for a learning and teaching module along with a pioneering strategy were introduced into the second-year undergraduate pharmacy curriculum for the course Pharmacy Practice. The goal of integrating the new tutorial modules and self-directed reflective learning activities—along with a new strategy, the Reflective Ability Clinical Assessment (RACA)—was to enhance the reflective thinking and learning capacity of pharmacy students.

Reflective activities integrated into the undergraduate pharmacy curriculum included a self-directed online learning activity (involving multiple-choice questions) to enhance understanding of the concept and purpose of reflective learning (Appendix 1) and a reflective thought guide (Appendix 2) for use with the clinical modules, to ascertain the outcome measures of the clinical cases. Following the introduction of these activities, the RACA took place, which included three main components: scenario writing of possible nonprescription events, reflective video podcasts (Figure 2), and a reflective statement (Appendix 3).

A quasi-experimental cross-over intervention-control design with repeated measures was employed to enhance the robustness of the research method (Figure 1). One of the advantages of using a cross-over design is the capacity to determine whether any improvement in reflective thinking ability is a result of student maturation.

Reflective ability and change in students' reflective thinking ability was evaluated using a previously validated tool that employed a 5-point Likert-type response scale.¹ This tool was adapted by the researchers so that it was applicable to pharmacy students. The word "pharmacy" was added prior to the words "course" and "lecturer," so that the tool was applicable to pharmacy students. Reflective ability was assessed at baseline (prior to integration of the reflective activities) and after integration of reflective activities.¹

All students participated in the reflective activities as part of the new curriculum material; however, approximately half the cohort commenced these activities first, followed by the remaining cohort. Students were asked to voluntarily complete the pre/postreflective thinking questionnaires (RTQ).¹ The cross-over design was carefully considered so that students were not disadvantaged. The cohort was divided into 10 tutorial groups. Five of the 10 tutorial groups (groups 1,2,3,7, and 8), labeled Intervention Group A, initially participated in the reflective activities. The remaining five tutorial groups (groups 4,5,6,9 and 10), labeled Control Group B, participated in regular curriculum activities.

Figure 1. Consort diagram: Cross-over design with repeated measures

As this study involved a number of teaching staff, tutorial groups were allocated into the the intervention or control group based on the staff teaching days. For example, one educator facilitated tutorial groups 1, 2, and 3, and these groups were placed into Intervention Group A. Another educator facilitated groups 7 and 8, and the students from these groups were also placed into Intervention Group A. Students from tutorial groups 4,5,6,9, and 10 were all placed into Control Group B as the third educator facilitated groups 4,5 and 6, and the fourth educator facilitated groups 9 and 10.

Students took tutorials at different stages throughout the semester and additional times were allocated for students to go online and complete the self-directed learning task (Appendix 1). Dates were also set for students to submit assessment tasks (RACA). All students were assured that they would eventually participate in all tutorials and would be given the same number of days to submit their assessment (RACA) tasks. Teaching staff were also informed of this process.

Once Intervention Group A completed their reflective activities and the assessment tasks, (which took

25 days), Intervention Group B (previously Control Group B) commenced the reflective tasks while Group A continued with the regular curriculum. Both groups were administered the RTQ prior to Control Group B commencing the intervention (Figure 1).

Prior to the reflective activities and modules, students were invited to go online and complete a self-directed learning activity as part of their pretutorial work. The purpose of this activity was to brief the students on the main concepts of reflection. This activity consisted of a series of multiple-choice questions relating to reflective practices (Appendix 1). In addition to this online activity and prior to commencing reflective tutorial modules, students in the intervention groups were asked to access evidence-based research articles on reflective practices used in pharmacy education.^{5,13,19,27} The purpose of this exercise was to enhance the understanding of the main concepts and importance of reflective practice.

The reflective tutorial modules followed the completion of the self-directed learning activities. The reflective tutorial modules consisted of a series of real hospital and community clinical cases for students to discuss during tutorial times. These modules encouraged students to “think outside the box,” by asking students to consider other aspects that might relate to alternative outcomes of a critical incident. For example, students were asked to consider a person’s biases, assumptions, firmly held beliefs, as well as their medication and clinical backgrounds. Students were provided with a reflective thought guide to assist them with final clinical decision making (Appendix 2). This guide was derived by an adaptation of similar guides used to enhance clinical decision making in nursing^{36,85,86} and medical education.¹¹

During the first day of the reflective modules, students were allocated a nonprescription condition and were asked to research the condition and the type of advice or products recommended for the condition. This formed the basis for their assessment tasks incorporated into the RACA. The purpose of the (RACA) was four fold: (1) to enhance self-directed learning activities, (2) to enhance counseling skills, (3) to encourage both self and peer reflection on a task, and (4) to provide valuable counseling practice for the summative end-of-semester oral assessment.

Part of enhancing the skills of reflective practice is to learn from experience.¹³ For students to prepare a possible nonprescription scenario, they were asked, as part of the reflective module, to voluntarily participate in a self-directed learning activity: an informal chat/interview with a practicing pharmacist (from either a hospital or community based clinical setting), which required the student to ask the practicing pharmacist about a nonprescription experience he or

she had previously dealt with. A guide of possible questions to ask the practicing pharmacist was provided to the students (Appendix 4).

This activity took place during the weeks between reflective module tutorials. Students had a general discussion about the complexities of clinical pharmacy practice during the following week’s tutorial (without disclosing pharmacist name or pharmacy details). Presented scenarios and challenges of pharmacy practice were discussed during the tutorial. Tutors were provided with a discussion guide to facilitate this exchange of information. This guide was based on the prompt reflective questions provided to the students for this activity (Appendix 4).

The scenario writing task was initiated to enhance research skills utilizing evidence-based medical guides. Each student was asked to research an allocated nonprescription condition and related signs, symptoms, advice, products, and when to refer to a physician. Example conditions included: heartburn, sunburn, impetigo, travelers’ diarrhea, worms, chicken pox, scabies, ticks, or head lice. These conditions differed from the conditions introduced in prior tutorial modules or lectures. This gave every student the best opportunity to have a new condition to research. Students were then asked to develop a possible scenario involving this condition, write about it, utilize the video podcasts to counsel a student in the role of the patient (maximum of 5 minutes for counseling), providing appropriate advice, counseling points, products, required referrals, and ensuring patient understanding. This exercise was followed by a reflective statement (Appendix 3).

The video podcasts were introduced as a means to reflect on counseling and clinical competency skills and as a practice for the upcoming oral examinations. Students were allocated into groups of two or three, and each student was asked to prepare one case using the allocated nonprescription condition and focus on communication and clinical competency skills. A maximum of a five minutes was allowed for the consultation video. Any form of technology was allowed (eg, iPhones, iPads, computers, tablets) to record the podcast. Provisions were made for students who did not have access to technology and were allowed to borrow devices from the faculty (school). Each student had to play the role of pharmacist, counsel, and write reflectively about the task itself. All students were then asked to swap partners and become the patient (thus enabling more communication practice) and encouraged to review and reflect on their partner’s counseling and clinical competency skills on the video podcasts (Figure 2). This exercise allowed for both self- and peer reflection. There was no limit placed on the podcasts recorded prior to uploading to Blackboard Learning Management System.

Figure 2. A model for using video podcasts to enhance reflective capacity (self- and peer reflection) of pharmacy students.

The reflective statement was an introspective writing task, which allowed students to open up and reflect on their skills, shortcomings, and challenges with the whole task (researching, scenario writing, producing a counseling video, and writing a reflective statement). Students were asked to consider challenges to their previously held beliefs and assumptions, and document strategies employed to overcome challenges, either through a change of behavior or through acknowledgment of updating their skills. The purpose of the reflective statement was to enhance self-reflection on the task so that students could then review and reflect on how they could improve their skills for future tasks (Appendix 3).

Approval for the study was granted by the University of Sydney Human Research Ethics Committee, the Teaching and Learning Committee, and the second-year course coordinator of the unit (course) of study in the Faculty of Pharmacy, University of Sydney.

EVALUATION AND ASSESSMENT

Although integration of the reflective activities into pharmacy education was a curriculum initiative, the research project involved pre/post administration of Kember's Reflective Thinking Questionnaire (RTQ).¹ Reliability of this tool has been validated with Cronbach alpha scores for the four scales in an acceptable range (0.621 – 0.757)¹

with the psychometric properties of the questionnaire further validated by Lethbridge and colleagues.⁸⁷ Coding schemes and rubrics based on Kember's scales from this questionnaire were developed and used to determine reflective thinking.⁶¹ The 16-item tool used a 5-point Likert-type scale that allowed quantitative measures to be collected. The basis of this questionnaire was drawn from Dewey's⁷³ and Mezirow's⁷⁸ theories of reflective thinking.⁸⁸

To evaluate the impact of integrating the reflective clinical modules into the curriculum, a cross-over intervention-control group design was employed. Repeated measures (at three different time points) were employed to contribute to the robustness of the research method and to enable the addition of another intervention group, thus increasing the sample size (Figure 1). We conducted a quantitative analysis of the reflective thinking questionnaire before (baseline) and after (25 days) reflective activities were integrated. Student responses were entered into SPSS, v20.0 (IBM Corp., Armonk, NY).⁸⁹ Each response required the student to circle a letter (A to E) for their choice to the relevant question on a 5-point Likert-type scale.

Each question on the RTQ related to one of four domains: (1) habitual action [doing something without much thought], (2) understanding [content and theory], (3) reflection [reviewing, questioning the way in which something is done, considering alternatives, reflecting on

actions or experiences], or (4) critical reflection [looking beyond reflection, questioning your firmly held beliefs and assumptions, discovering shortcomings, changing behavior]. Neither habitual action nor understanding are considered reflective thinking. Although the concept of understanding can be considered reflective when a personal experience is drawn upon, the understanding of content or theory is not considered a reflective concept. As this study focused on the reflective and critical reflective ability, questions 3, 4, 7, 8, 11, 12, 15, and 16 were collated and analyzed. Three measures were analyzed: (1) The cumulative scores from the reflective questions [3, 7, 11, and 15]; (2) the cumulative scores for the critical reflection questions [4, 8, 12, and 16], and (3) the combination of the cumulative scores from the reflection plus the critical reflection scores [3, 7, 11, 15, 4, 8, 12, and 16].¹

Two statistical procedures were conducted, an analysis of covariance (ANCOVA) and a repeated measures analysis of variance (ANOVA). To determine if there were significant differences ($p < 0.05$ level) between the two groups (Intervention Group A vs Control Group B) in the reflective thinking ability of students after the intervention, the ANCOVA was employed. The ANCOVA provided a means for controlling pretest scores on the RTQ, thereby reducing systematic bias, as well as within-groups error in the analysis.⁹⁰ To determine if the outcome variable (posttest scores on the RTQ) had an effect, the covariate (pretest scores) on the dependent variable was controlled for during the analysis.

Levene's tests were conducted ($p > 0.05$), indicating that the homogeneity of variance assumptions were not violated. Three outcome variables were tested: (1) reflective thinking ability; (2) critical reflective thinking ability; and (3) cumulative scores of reflective thinking ability questions and critical reflective ability questions. As the RTQ contained questions relating to other domains such as understanding and habitual action, only the scores calculated from the questions regarding reflective processes were analyzed, as well as the cumulative scores from all the reflective-type questions (reflective thinking ability and critical reflective thinking ability) were measured as the third indicator of reflective thinking change. The results from the ANCOVA analyzes are recorded in Tables 1-3 of Appendix 5.

Results of the ANCOVA showed that Intervention Group A reported an improvement in reflective thinking ability compared to Control Group B [$F(1, 211) = 32.2$, $p < 0.01$; (Table 1)]. The partial Eta squared ($\eta_p^2 = 0.13$) indicated 13% of the variance of reflective thinking ability could be explained by the group identity (Intervention Group). The observed power was 1.0 (computed using $\alpha = 0.05$). Observed power values over 0.08 indicated acceptable results.⁹¹

Intervention Group A reported an improvement in critical reflective thinking ability compared to Control Group B [$F(1, 211) = 20.5$, $p < 0.01$; (Table 2)]. The partial Eta squared, $\eta_p^2 = 0.088$ indicated 9% of the variance of critical reflective thinking ability could be explained by the group identity (Intervention Group). The observed power was 0.99 of 1.00 (computed using $\alpha = 0.05$).

Intervention Group A reported an improvement in reflective thinking ability plus critical reflective thinking ability compared to Control Group B [$F(1, 211) = 36.5$, $p < 0.01$; (Appendix 5,⁹¹ Table 3)]. The $\eta_p^2 = 0.15$, indicated 15% of the variance of the cumulative scores of reflective thinking and critical reflective thinking ability could be explained by the group identity (Intervention Group). The observed power was 1.000 (computed using $\alpha = 0.05$).

A repeated measures ANOVA was also conducted as an additional confirmatory analysis to determine the difference between the RTQ test scores (reflective thinking ability scores plus critical reflective thinking ability scores) from Control Group B / Intervention Group B at time 1 (M: baseline 28.2), time 2 (M: preintervention 27.7) and time 3 (M: postintervention 30.1). The repeated measures ANOVA with a Bonferroni paired comparison revealed a significant difference between test scores for time 3 and time 1 ($p < 0.01$), time 3 and time 2 (after intervention, $p < 0.01$), and a nonsignificant difference between tests scores from time 2 and time 1 (preintervention, $p = 0.26$).

DISCUSSION

This study aimed to measure the impact of integrated reflective activities and assessment tasks on the reflective thinking ability of undergraduate pharmacy students in a Pharmacy Practice course. From a cohort of 264 students, 238 students (90% response rate) responded voluntarily to complete the pre/post-RTQs. This yielded 214 valid questionnaires. Both intervention groups (A and B) showed a significant improvement in reflective thinking ability postreflective activities and reflective assessment tasks, indicating that integrating reflective activities into pharmacy curriculum has a positive impact on a student's reflective thinking capacity.

Repeated measures ANOVA on the Control Group B between the different RTQ scores at the different times indicated that for those students who were not involved with the reflective activities and assessment tasks during that time of the semester, there was no improvement in reflective thinking ability (from time 1 at baseline and time 2). It was not until the same students, who then became the second intervention group (B), participated

in the reflective tasks, that their reflective thinking capacity improved significantly.

The limitations of this study were threefold: it involved only one course in a pharmacy curriculum; the study was of students from one pharmacy school; and a small number of teaching staff taught the reflective modules. Despite these limitations, the large sample size (n=264), positive response rate for the RTQs, and cross-over intervention-control design with repeated measures provided robustness to the study. Furthermore, the teaching staff all received training from the lead author and the small number of teacher participants ensured a greater consistency of teaching.

Implementation of structured and guided reflective activities in education for health professionals helps to develop reflective-thinking skills that improve clinical practice.^{9,11,36,37,39,92,93} Furthermore, research supports teaching and facilitating reflective practice in health professions education to develop students' understanding of its application for clinical practice.⁹⁴ The results of our study provide evidence for the positive impact that integrating varied, structured reflective practice activities into the curriculum has on the reflective-thinking ability of students. Scaffolding such activities across a curriculum, however, poses challenges for both teacher and student. For example, developing reflective learning modules, grading, and organizing structured assessment tasks takes time, expertise, and resources. From the student's perspective, learning and practicing reflective thinking may be a new way of constructing knowledge, thus presenting intellectual and, at times, emotional challenges. Nevertheless, the benefits include improving students' clinical decision-making capabilities and potentially future pharmacy practice.

Further research is currently being undertaken to investigate student feedback and teacher participant perceptions of the integration of the reflective activities into curriculum and to explore the relationship between reflective learning and academic performance outcomes.

SUMMARY

This research focused on the impact of a new learning and teaching module and assessment task (RACA) integrated into an undergraduate pharmacy curriculum. These resources were designed to enhance pharmacy student understanding of reflective practice and improve reflective thinking skills. Student responses to the RTQ pretest and posttest showed an improvement in their reflective thinking ability. Thus, integrating reflective activities into curriculum enhanced reflective capacity. The strengths of this study were its large sample size and the cross-over intervention-control group design with

repeated measures. As reflective thinking is a necessary attribute for health professionals and for enhancing skills in lifelong learning, further research into the impact of integrating reflective thinking modules into other courses should also be considered.

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Appendix 1. Reflective Practice Online Learning Activity

Which is the best answer to the following questions on reflective practices?

Reflective tools may include the following:

- a) Journals, diaries, portfolios, videos, e-portfolios
- b) Diaries, portfolios, reflective podcasts, log books
- c) e-journals, e-diaries, e-portfolios, reflective videos
- d) All of the above.

Which of the following is NOT considered a reflective statement?

- a) "The lectures that were provided during last semester made me aware of the significance of the formal organizational systems that assist employees to carry out tasks in the pharmacy."
- b) "The position I held during that 6-month period forced me to be more proactive about initiating pharmaceutical care plans."
- c) "Integrated Dispensing Workshops are situated in the main labs on the first floor, thus allowing those who require wheel chair access, the opportunity to participate."
- d) "Having the opportunity to observe the Integrated Dispensing Workshop last week allowed me to feel more confident in my ability to dispense this week."

Outcomes of reflection and/or critical reflection include:

- a) Connections of new knowledge with previous knowledge
- b) Gaining new perspectives or new insights to further improve future practice
- c) Considering the differences between individuals regarding their beliefs, approaches, and assumptions.
- d) All of the above

Which of the following is considered an example of a reflective question?

- a) "Will you be ready on time for the pharmacy workshop?"
- b) "How did you feel at the time of the accident?"
- c) "What is the examination workload in Pharmaceutical Chemistry this year?"
- d) "Do pharmaceutical lectures increase knowledge in areas of pharmacy practice?"

Reflective practice is important in pharmacy education because:

- a) It allows pharmacy students to socialize with other students
- b) It assists with the integration of theory and complexities of practice
- c) It only relates to the pharmacy profession
- d) It is a process to assist with making extemporaneous products in a pharmacy environment.

Which of the following is NOT considered a reflective statement?

- a) "This process has heightened my awareness of the skills that I had previously learned through the continuing professional development program."
- b) "I realize now that utilizing the skills that I have learned through the Intern Training Program at the University of Sydney has allowed me to be a better practitioner."
- c) "The incident occurred at 5pm and involved a passenger and a driver with poor eye sight."
- d) "Initially I felt that I was too inexperienced to deal with the situation, however as I was the only student with a medical background, I had no choice but to assist to the best of my limited ability the students who were passengers in the car accident."

Reflective practices:

- a) Have been utilized in the education of nonpharmacist health professions education to enhance reflective ability
- b) Have only been utilized by pharmacy practitioners/pharmacists
- c) Involve clinical issues only
- d) Do not enhance new learning or new perspectives.

A reflective practitioner:

- a) Conveys his/her personal thoughts and feelings about an incident or event
- b) Believes that describing an event in detail is an element of true critical reflection
- c) Relates a new incident, event, or experience to a previous incident, event, or experience
- d) Both a AND c are correct.

Which of the following is NOT considered a reflective statement?

- a) "The pharmacist who was the manager of the store interacted with his clients in a friendly manner."
- b) "The reservations I currently feel about practicing in a hospital setting suggest that I am not yet ready for such a change. Therefore, at this stage I plan to continue my work in a community setting until I obtain enough experience and confidence before I search for a hospital position."

- c) "It seems that the pharmacist's role differs depending on the work environment whether it is in a hospital setting or a community environment."
- d) "Analysis of pharmacy resources such as the therapeutic guidelines, along with my previous lecture material on cardiovascular disease, allowed me to grasp the main concepts more easily."

Adopting reflective practices in pharmacy education aims to:

- a) Foster reflective thinking and learning and critical-thinking skills
- b) Develop clinical-reasoning skills and enhance self-directed learning
- c) All of the above
- d) None of the above.

Appendix 2. Reflective Thought Guide

1. Reread the case
2. What was the critical incident or scenario that occurred?
3. Think about the external factors that may have influenced the case and its outcomes (eg, biases, beliefs, assumptions).
4. What were the main outcomes of the incident?
5. What evidence supports the likelihood of the outcome?
6. What were the key issues or concerns that required the practicing pharmacist to handle with care?
7. Were there any particular skills that the practicing pharmacist had that proved vital in this incident or situation?
8. Based on evidence, what suggestions, advice, or alternatives could be given?
9. What was learned as a result of this incident?
10. Was there any change in practice that was adopted as a result of the incident in order to improve future practice?

Appendix 3. Reflective Statement

The reflective statement should demonstrate an ability to undertake reflection and critical analysis. In achieving this, this personal statement should reflect upon, among other things, the following:

1. What were your thoughts, feelings, and beliefs towards the task and were they altered by performing the task?
2. How did you prepare for this task?
3. What happened in the task?
4. What were your strengths or skills that you found applicable to the task?
5. Did you encounter any problems (personal, weaknesses, barriers addressed) while undertaking the task and, if so, how did you overcome them?
6. What have you learned as a result of this task, and how may it benefit you in the future?

Appendix 4. Prompt Reflective Interview Questions

Sample of prompt reflective interview questions with the practicing pharmacist:

1. Can you briefly describe an incident or experience that has occurred while practicing pharmacy that has impacted on the way you do things now?
2. How did you feel about the experience?
3. What was the most important or relevant part of this experience?
4. Did you feel that the experience was a positive or negative one and why?
5. Did you feel that your previous knowledge helped during the experience? If not why?
6. Was the experience similar to any previous experience you have had?
7. Was this experience different from any other experience you have had previously?
8. What problems did you encounter from the experience?
9. If you did encounter any problems, how did you overcome them?
10. Were there any environmental or other issues that influenced the experience?
11. What did you learn from that experience?
12. Did this experience influence the way you do things now and if so how?
13. Have you changed anything since that experience?
14. Have any of your previous beliefs changed as a result of the experience? If so how?

Appendix 5. Results of Analyses of Covariance (ANCOVA)

Table 1. Adjusted Mean Scores Using the Dependent Variable Reflective Thinking Ability

Group Type	N	Adjusted Mean Score	95% Confidence Interval	
			Lower Bound	Upper Bound
Group A (Intervention)	111	16.2 ^a	15.9	16.5
Group B (Control)	103	15.0 ^a	14.7	15.3

^aCovariates appearing in the model are evaluated at the following values: RTQ1 Total Score from Reflective Thinking Questionnaire (1) Reflection=15.9

Table 2. Adjusted Mean Scores Using the Dependent Variable Critical Reflective Thinking Ability

Group Type	N	Adjusted Mean Score	95% Confidence Interval	
			Lower Bound	Upper Bound
Group A (Intervention)	111	14.7 ^a	14.3	15.1
Group B (Control)	103	13.5 ^a	13.1	13.9

^aCovariates appearing in the model are evaluated at the following values: RTQ1 Total Score from Reflective Thinking Questionnaire (1) Critical Reflection=13.6

Table 3. Adjusted Mean Scores Using the Dependent Variable Reflective Thinking Ability Plus Critical Reflective Thinking Ability

Group Type	N	Adjusted Mean Score	95% Confidence Interval	
			Lower Bound	Upper Bound
Group A (Intervention)	111	30.90 ^a	30.4	31.4
Group B (Control)	103	28.5 ^a	28.0	29.1

^aCovariates appearing in the model are evaluated at the following values: RTQ1 Total Score from reflective actions (reflection plus critical reflection)=29.5