

Reflection — an effective strategy for outcome-based learning in basic medical sciences

Uzma Mussarat,¹ Abeerah Zainub,² Rabia Hanif,³ Sadaf Ayub,⁴ Fakhra Naureen,⁵ Tahira Inam⁶

Abstract

Objective: To determine the role of guided reflection for improved learning outcomes in students of basic dental sciences.

Method: The quasi-experimental comparative educational study was conducted at the Islamic International Dental College, Islamabad, Pakistan, from May to September 2019, and comprised second-year undergraduate students in the Basic Medical Sciences curriculum for Microbiology. The subjects were arbitrarily divided into Group-1, which was exposed to guided reflection, and Group-2, which was not asked to reflect on the lectures. Post-intervention, a test of 30 multiple choice questions on the selected topics was conducted to compare the level of learning between the groups. After three weeks, the same activity was repeated with the same groups, but with different topics of lectures. Data was analysed using SPSS 21.

Results: Of the total 75 students, there were 28 female and 9 male students in Group-1 (Reflectors), 29 female and 9 male students in Group-2 (Non-Reflectors). Overall, there were 18 male and 57 female students. The overall 20.4 ± 0.83 years. The difference between the groups after the first session was not significant ($p > 0.05$). After session 2, Group-1 score was significantly better than that of Group-2 ($p < 0.05$).

Conclusion: Reflective practices on teaching sessions at the end of lectures proved to be an effective strategy to achieve outcome-based learning.

Keywords: Guided reflection, Teaching strategy, Basic medical sciences, Outcome-based learning.

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Introduction

Reflective practices can contribute to health professional education by assisting students in progressing their clinical skills and augmenting academic performance. Research studies have proven the role of reflective writing within health education.^{1,2} The aptitude of reflecting on a deeper level is a desirable attribute for all health professionals. Different scholars have postulated that by fostering reflective writing, students can be motivated towards deep learning. Reflective education is a perception that accentuates the responsiveness of one's knowledge, previous experiences and beliefs. For instance, according to some scholars, reflection involves critical examination of one's own beliefs and attitudes to develop self-awareness, self-monitoring and self-regulation.^{3,4} Moreover, it can be an effective tool to augment information retention, especially in a traditional educational classroom setting. Decision powers and clinical judgments flourish more via reflective thinking. In addition, it may help students to deeply understand the

topic for future practice with improved problem-solving, action planning capabilities, augmented enthusiasm, self-assurance and communication expertise.^{5,6}

Reflective writing can be used as a milestone to upgrade performance, behaviour, self-directed learning, problem-solving, communication, and students' professional skills via the continuous process of critical analysis.⁷ In addition, these practices potentiate the students' abilities to acquire new knowledge and support them to integrate and extract meaning by linking the latest information with prior experiences.^{8,9} Moreover, reflective skills used in medical education have proven its consequences as improved clinical reasoning by fostering the abilities of observation, analysis, understanding and interpretation.¹⁰

Reflective tools like declarations, papers, portfolios, journals, records, or blogs¹¹ can be used to potentiate students' thinking skills to address their prejudices, firmly held beliefs and expectations.¹² Moreover, these reflective tools have been used as an effective educational strategy to assess the level of learning in medical students to address the weakness and strength of the designed curriculum. Literature has advocated that reflective tools, especially reflective writing, are compulsory to reform medical students into reflective practitioner as a core attribute for professional development.^{10,13} Nowadays,

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¹Department of Pathology, ²Department of Biochemistry, ^{3,6}Department of Pharmacology, Islamic International Dental College, Islamabad, ⁴Department of Biochemistry, ⁵Department of Pathology, Islamic International Medical College, Rawalpindi, Pakistan.

Correspondence: Uzma Mussarat. Email: uzma_arslan5@yahoo.com

health professions focus on students' development by using "Guided reflection" to enhance their reflective-writing abilities to manage continuing proficiencies and capabilities. It provides an opportunity to polish the skills of critically analysing an experience and learning through it. No appreciable data is available regarding the evaluation the effectiveness of this innovative learning strategy concerning basic medical sciences which may be significant enough to improve the traditional lecturing style. The current study was planned to appraise the effects of reflective writing on overall performance of students, and to determine the role of guided reflection in outcome-based learning among students of basic medical sciences.

Subjects and Methods

The quasi-experimental comparative educational study was conducted at the Islamic International Dental College, Islamabad, Pakistan, from May to September 2019. The post-test-only design along with a control group is suitable for educational research occurring in a natural setting where proper randomisation is not possible.¹⁴ After approval from the institutional ethics review committee (ERC), the sample was raised using purposive sampling technique and approaching all students of the 2nd-year class. The subjects were arbitrarily divided into Group-1, which was exposed to guided reflection, and Group-2, which acted as the control group and was not asked to reflect on the lectures. Group-1 comprised sections A and C of the batch, while Group-2 comprised sections B and D. Consent for participation was taken from the students.

Two sessions of activity were planned for research purpose. In the first session, the topics were selected to be taught via lectures in the class. Group-1 subjects were explained the process of reflection using Gibbs reflective cycle (Figure-1) which has been described in literature as a very effective reflection guiding tool for undergraduate medical students.^{15,16} Gibbs model has been used in many types of research, and the results showed that it helped the students become aware of reflective writing skills. Subsequently, a PowerPoint presentation was used about the Gibbs cycle to introduce the students to reflective writing and later on, after the lectures, the students were briefed to fill out an open-ended questionnaire which had, based on Gibbs reflective cycle, a validated tool for teaching reflective writing. (Appendix).

The questionnaire was used as a feedback response. The student reflections were assessed on the pre-validated reflection evaluation for students enhanced competencies (REFLECT) tool. In the past, this tool has



Figure-1: Gibbs reflective cycle.

Appendix

An open-ended questionnaire was given to students to reflect on.

- Q 1. Give a brief description of the experience
- Q 2. Express your feelings during the session
- Q 3. Mention the points that help in the evaluation of the session
- Q 4. Describe your analysis of this learning session or activity. Comment on to what extent you are able to retain and recall today's learning objectives
- Q 5. How you conclude after attending or learning through this strategy
- Q 6. What action plan do you suggest to improve this learning session?

been used to evaluate clinical students' constructive feedback.¹⁷

Later, a test in the form of formative assessment consisting of 30 multiple choice questions (MCQs) with single correct answer relevant to the selected topics was conducted to compare the level of learning between the groups. Three weeks later, the same activity was repeated with the same class and the same groups, but with a different topic of lecture.

Data was analysed using SPSS 21. Independent sample student t-test was used as appropriate. Descriptive statistics were computed for each categorical variable, Mean and standard deviation were calculated for numerical variables. Student t-test was applied to compare the mean values. $P < 0.05$ was considered statistically significant.

Results

Of the total 75 students, there were 28 female and 9 male students in Group-1 (Reflectors), 29 female and 9 male students in Group-2 (Non-Reflectors). Overall, there were 18 male and 57 female students. The overall 20.4 ± 0.83

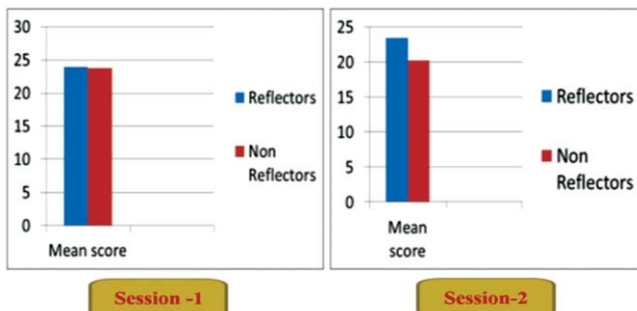
Table: Demographic data of participants.

No. of Groups	Age (years)	No. and Gender of participants Total No. of participants- 75			
Group 1- Reflectors	20.43 ±0.813	Male students	9	Female students	28
Group 2- Non. Reflectors	20.39±0.831	Male students	9	Female Students	29

Table-2: Comparative performance of reflectors and non-reflectors.

	Score in 1st Formative Assessment (Mean ± SD)	p value
Session-1		
Reflectors	23.9355± 4.802033	0.8
Non Reflectors	23.7742± 3.80096	
Session-2		
Reflectors	23.4516±4.44851	0.018*
Non Reflectors	20.1935±5.40629	

* P-value < 0.05 (significant).

**Figure-2:** Mean scores of the two groups after each of the two sessions.

years. The difference between the groups after the first session was not significant ($p > 0.05$). After session 2, Group-1 score was significantly better than that of Group-2 ($p < 0.05$) (Figure-2; Table).

Discussion

The study revealed the prognostic association between reflective-writing skills and academic achievements in two formative assessments. Students using guided reflection were able to acquire proficiency, and upgraded their learning skills compared to the non-reflectors who used the self-regulated approach. The study revealed the improved performance of the reflectors after the second formative assessment in spite of the fact that they reflected before the first formative assessment as well.

The positive and constructive influence of reflective writing, as proven in the current study, is strongly supported by an earlier study which showed that reflection can inspire academic performance by playing a role in learning styles and approaches.¹⁸ Assessment serves as a drive for learning. As such, if reflective practices are not

assessed, the students may not see them as significant compared to the other assessed tasks. This finding is in accordance with that of a study which demonstrated that teaching innovations in the classroom play an effective role in modifying the learning process, and that the location of knowledge is flexible and changeable.¹⁹

The present study's findings are consistent with the suggestion that role models and mentors meant to facilitate and guide learners' reflections are a mandatory part of the process.²⁰ The results also resonate with another study that highlighted the benefits of using student reflections as a part of teaching anatomy curriculum in undergraduate medical students.²¹ The current study showed that the repeated process of reflection polishes the skills of reflecting on a particular process. A study presented well-documented pieces of evidence that reflection is not essentially a spontaneous process and reflection on a regular basis inspires students to use this strategy as a tool for academic learning.²²

Promoting reflective-writing among medical students helps them critically analyse a situation and, in turn, may enhance competence. It has been advocated in the past to make reflective practice an educational strategy in undergraduate medical students.²³ The practice of reflective-writing was beneficial for the students and that has been shown in an earlier study as well.²⁴ One study showed reflective practices promoted personal strengths and developed the ability to recognise resources and ways to explain professional challenges.²⁵ The current study found that acquiring reflection improved the performance of the students. One study demonstrated that effective reflection-writing helped acquire the skills as measured by performance on reflective activities.¹⁸ Another study suggested that reflection appeared to notably improve academic achievement, ease productive commitment with learning and fostered students' confidence in the use of critical thinking and clinical conclusion.²⁶ Reflection has emerged as one of the essential components of training medical professions because of the extensive connections it has with abilities related to reflective thinking, critical thinking, problem-solving, self-assessment, integration, theoretical and practical learning.²⁷

The current study has limitations, like a small sample size. Also, due to limited resources, the subjects were recruited from one discipline only, and limited formative sessions were conducted to evaluate the students' performance.

If reflective practices are to be merged into Basic Medical Sciences curricula, constructive alignment of these practices with assessments is required. Future research

should also evaluate the effectiveness of using the REFLECT rubric for assessing learning outcomes. Research is needed on both the process and outcomes of defined curricular innovations in refining robust reflective practice skill-set, reducing stress, identifying and enhancing resiliency factors, and positively influencing the learners' wellbeing and patient care.

Conclusion

Reflective practices on teaching sessions at the end of lectures can be used as an effective strategy to achieve the goal of outcome-based learning.

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References

- Embo M, Driessen E, Valcke M, van der Vleuten CP. Integrating learning assessment and supervision in a competency framework for clinical workplace education. *Nurse Educ Today* 2015;35:341-6. doi: 10.1016/j.nedt.2014.11.022.
- Embo MP, Driessen E, Valcke M, Van Der Vleuten CP. Scaffolding reflective learning in clinical practice: a comparison of two types of reflective activities. *Med Teach* 2014;36:602-7. doi: 10.3109/0142159X.2014.899686.
- Bjerkvik LK, Hilli Y. Reflective writing in undergraduate clinical nursing education: A literature review. *Nurse Educ Pract* 2019;35:32-41. doi: 10.1016/j.nepr.2018.11.013.
- Timizar-Le Pen T, Marchand C, Léocadie M, Rothan-Tondeur M. Reflective writing: Implementation and learning perception from students and teachers of French nursing schools. *Nurse Educ Pract* 2020;49:102921. doi: 10.1016/j.nepr.2020.102921.
- Tonni I, Mora L, Oliver RG. Postgraduate Orthodontics Students' and Mentors' Perceptions of Portfolios and Discussion as Tools for Development of Reflection. *J Dent Educ* 2016;80:1098-108.
- Griggs V, Holden RJ, Lawless A, Rae J. From reflective learning to reflective practice: assessing transfer. *Stud High Educ* 2018;43:1172-83. doi: 10.1080/03075079.2016.1232382
- Tsingos C, Bosnic-Anticevich S, Smith L. Reflective practice and its implications for pharmacy education. *Am J Pharm Educ* 2014;78:18. doi: 10.5688/ajpe78118.
- Tsingos C, Bosnic-Anticevich S, Lonie JM, Smith L. A Model for Assessing Reflective Practices in Pharmacy Education. *Am J Pharm Educ* 2015;79:124. doi: 10.5688/ajpe79124.
- Tsingos-Lucas C, Bosnic-Anticevich S, Schneider CR, Smith L. The Effect of Reflective Activities on Reflective Thinking Ability in an Undergraduate Pharmacy Curriculum. *Am J Pharm Educ* 2016;80:65. doi: 10.5688/ajpe80465.
- Karkabi K, Wald HS, Cohen Castel O. The use of abstract paintings and narratives to foster reflective capacity in medical educators: a multinational faculty development workshop. *Med Humanit* 2014;40:44-8. doi: 10.1136/medhum-2013-01037.
- Habash R. Professional practice in reflection. *Professional Practice in Engineering and Computing: Preparing for Future Careers*, 1st ed. Boca Raton, USA: CRC Press; 2019.
- Hobson EH, Johnston PE, Spinelli AJ. Staging a reflective capstone course to transition PharmD graduates to professional life. *Am J Pharm Educ* 2015;79:14. doi: 10.5688/ajpe79114.
- Embo M, Driessen E, Valcke M, van der Vleuten CP. Relationship between reflection ability and clinical performance: a cross-sectional and retrospective-longitudinal correlational cohort study in midwifery. *Midwifery* 2015;31:90-4. doi: 10.1016/j.midw.2014.06.006.
- Bärnighausen T, Tugwell P, Röttingen JA, Shemilt I, Rockers P, Geldsetzer P, et al. Quasi-experimental study designs series-paper 4: uses and value. *J Clin Epidemiol* 2017;89:21-29. doi: 10.1016/j.jclinepi.2017.03.012.
- Adeani IS, Febriani RB, Syafriyadin S. Using Gibbs' Reflective Cycle in Making Reflections of Literary Analysis. *Indonesian EFL Journal* 2020;6:139-48. doi: 10.25134/iefj.v6i2.3382.
- Choo YB, Abdullah T, Nawi AM. Learning to Teach: Patterns of Reflective Practice in Written Journal. *LSP International Journal* 2018;5:49-57. doi: 10.11113/lspi.v5n2.80
- Wald HS, Borkan JM, Taylor JS, Anthony D, Reis SP. Fostering and evaluating reflective capacity in medical education: developing the REFLECT rubric for assessing reflective writing. *Acad Med* 2012;87:41-50. doi: 10.1097/ACM.0b013e31823b55fa.
- Cherie Tsingos C, Bosnic-Anticevich S, Smith L. Does a learning style preference for processing information through reflection impact on the academic performance of a cohort of undergraduate pharmacy students? *Pharm Educ* 2015;15:233-40.
- Bergmann J, Sams A. *Flip Your Classroom: Reach Every Student in Every Class Every Day*, 1st ed. Oregon, USA: International Society for Technology in Education; 2012.
- Cruess RL, Cruess SR, Boudreau JD, Snell L, Steinert Y. Reframing medical education to support professional identity formation. *Acad Med* 2014;89:1446-51. doi: 10.1097/ACM.0000000000000427.
- Lachman N, Pawlina W. Integrating professionalism in early medical education: the theory and application of reflective practice in the anatomy curriculum. *Clin Anat* 2006;19:456-60. doi: 10.1002/ca.20344.
- Pretorius L, Ford A. Reflection for Learning: Teaching Reflective Practice at the Beginning of University Study. *Int J Teach Learn High Educ* 2016;28:241-53.
- Sandars J. The use of reflection in medical education: AMEE Guide No. 44. *Med Teach* 2009;31:685-95. doi: 10.1080/01421590903050374.
- Wald HS, Weiss B. Making it "More Real": Using Personal Narrative in Faculty Feedback to a Medical Student's Reflective Writing – An Illustrative Exemplar, version 1. *MedEdPublish* 2018;7:171. doi: 10.15694/mep.2018.0000171.1
- Bruno A, Dell'Aversana G. Reflective practicum in higher education: the influence of the learning environment on the quality of learning. *Assess Eval High Educ* 2018;43:345-58. DOI: 10.1080/02602938.2017.1344823
- Yusuff KB. Does self-reflection and peer-assessment improve Saudi pharmacy students' academic performance and metacognitive skills? *Saudi Pharm J* 2015;23:266-75. doi: 10.1016/j.jsps.2014.11.018.
- Rahimi M, Haghani F. Reflection in Medical Education: A Review of Concepts, Models, Principles and Methods of Teaching Reflection in Medical Education. *Res Med Educ*. 2017;9:13-24. doi: 10.29252/rme.9.2.24.