

Assessment of Problem-Based Learning (PBL): Poster Presentation as a Tool of Assessment

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Abstrak

Penilaian dianggap sebagai satu-satunya penentu pembelajaran yang paling signifikan yang mempengaruhi perilaku belajar siswa secara luas. Namun penilaian dalam konteks PBL membutuhkan keselarasan konstruktif antara tujuan PBL dan penilaian yang dapat dicapai melalui pendekatan penilaian integrative. Tujuan penelitian ini yaitu untuk menilai kinerja kelompok siswa yang berpartisipasi dalam PBL untuk persiapan poster dan presentasi pada acuan-kriteria. Jenis penelitian ini yaitu penelitian deskriptif. Metode yang digunakan dalam mengumpulkan data yaitu observasi dan kuesioner. Instrumen yang digunakan dalam penelitian ini yaitu kuesioner. Teknik yang digunakan untuk menganalisis data yaitu analisis deskriptif kualitatif, dan kuantitatif. Hasil penelitian yaitu setengah dari kelompok siswa mendapat nilai kurang dari 50% dalam mendesain poster. Pada "isi mata pelajaran masing-masing poster individu dari kursus yang tercakup dalam PBL. Dua kelompok mendapat skor lebih dari 9 (dari sepuluh), 6 kelompok lebih dari 8 (dari sepuluh) dan 2 kelompok 7 (dari sepuluh). Tujuh kelompok memperoleh skor 4,25 atau lebih (dari 5), dan tiga kelompok antara 3 dan 4 (dari 5) untuk presentasi poster secara lisan (verbal). Kinerja kelompok siswa di bawah standar pada mendesain poster sangat baik pada "isi subjek" dan luar biasa untuk presentasi poster lisan (verbal).

Kata kunci: Penilaian, PBL, Presentasi Poster

Abstract

Assessment is considered the single most significant determinant of learning that influences student learning behavior broadly. However, assessment in the context of PBL requires a constructive alignment between PBL objectives and assessment, which can be achieved through an integrative assessment approach. This study aimed to assess the performance of groups of students participating in PBL for poster preparation and presentation on criteria-referenced. This type of research is descriptive research. The methods used in collecting data are observation and questionnaires. The instrument used in this research is a questionnaire. The techniques used to analyze the data are descriptive, qualitative, and quantitative. The study results were that half of the students scored less than 50% in designing posters on the "subject content of each poster of the courses covered in PBL. Two groups scored more than 9 (out of ten), 6 groups more than 8 (out of ten), and 2 groups of 7 (out of ten). Seven groups scored 4.25 or more (out of 5), and three groups were between 3 and 4 (out of 5) for verbal poster presentations. The substandard student group performance on poster design was excellent on "subject content" and outstanding for verbal poster presentations.

Keywords: Assessment, PBL, Poster Presentation

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1. INTRODUCTION

Learning is an activity programmed by the teacher in instructional design, which will create a process of interaction between students, teachers, and students and with learning resources. Learning aims to change students' behavior and thinking in a learning environment (Bouton et al., 2021; Perdana et al., 2020; Yan et al., 2021). The learning process is inseparable from teaching and learning activities. Learning can also be said to be a process characterized by changes in a person. Learning causes permanent behavioral changes due to experience (Guo et al., 2021; Ruslan et al., 2021; Yustina et al., 2020). One sign that

someone has learned something is a change in behavior in him. These behavioral changes involve changes in knowledge (cognitive) and skills (psychomotor) as well as those concerning values and attitudes (affective) (Chen et al., 2019; Indrianto & Fatmawati, 2020; Sung, 2017). Learning does not only cover subjects but also mastery, habits, perceptions, enjoyment, competence, social adjustment, various skills, and aspirations (Hendriwanto et al., 2021; Liao et al., 2014). Learning is essentially a process of interaction between students and their environment, resulting in changes in behavior for the better (Insyasiska et al., 2015; Smeets, 2017). During the learning process, the most crucial task of the teacher is to condition the learning environment to support student behavior change (Filgona et al., 2017; Khairani et al., 2019). Learning is a two-way communication process; the teacher teaches as an educator while students or students learn. Learning is an effort to teach students. In this sense, in teaching, there are activities to choose, define, and develop methods to achieve the desired teaching results (Potvin et al., 2021; Revathy et al., 2021). Learning is the actualization of the curriculum that demands teachers' activeness in creating and growing student activities per the programmed plans (Ana & Achdiani, 2017; Molin et al., 2020). Learning activities must use learning methods that can help learning activities run smoothly. One of the methods used in learning is Problem based learning (Silwana et al., 2020; Yonanda et al., 2019).

The PBL process is not merely a procedure. Nevertheless, this method is part of learning self-management as a life skill. Problem Based Learning (PBL) can provide skills in managing life for students to overcome obstacles in their environment (Silwana et al., 2020; Yassin, 2010). Problem-based Learning is a learning approach that uses real-world problems as a context for students to learn about critical thinking and problem-solving skills and acquire essential knowledge and concepts from learning materials (Sitompul, 2021; Tanti et al., 2021; Yonanda et al., 2019). Problem-Based Learning is an innovation in Learning because, Problem-Based learning, students' thinking abilities are optimized through a systematic group or teamwork process so that students can empower, hone, test, and develop their thinking skills on an ongoing basis (Diah & Riyanto, 2016; Kristinawati et al., 2018). Problem Based Learning (PBL) uses real-world problems as learning materials to develop students' thinking skills in solving an existing problem (Dupri et al., 2020; Wahyuni et al., 2017).

Problem Based learning (PBL) is an instructional method of teaching learning. It offers different types of active learning prospects. It emphasizes on fostering abilities such as clinical reasoning, metacognition, self-directed learning and deep learning and enhances generic skills like communication skills, presentation skills, team skills (Vleuten & Schuwirth, 2019). Assessment is considered as the single-most significant determinant of learning which affects students' learning behavior to great extent (Ross et al., 2019). As PBL engages students in different types of learning, so, the assessment of PBL too is varied (Vleuten & Schuwirth, 2019). But the assessment in the context of PBL requires constructive alignment between the objectives of PBL and assessment which can be attained through integrative approach to assessment (Eva et al., 2016; Norcini et al., 2018; Vleuten & Schuwirth, 2019). A poster presentation is one of the experiential learning activities. It generates curiosity and inquisitiveness, boosts searching and assimilation of concepts and offers students a novel way of demonstrating their knowledge and skills. Poster presentations are thought as an innovative way to encourage deep purposeful engagement of students in learning (Ross et al., 2019). Poster presentation enhances the students' academic speaking performance. Hence, besides assessing academic performance, generic skills like presentation skills and communication skills can be assessed (Tarigan & Listyani, 2021). The posters are better assessed on criterion-referenced assessment which is fairly based on the principles of validity, reliability and transparency.

2. METHODS

This descriptive study was conducted in the month of October 2021 at Bilawal Medical College (BMC) for Boys, a constituent medical college of Liaquat University of Medical and Health Sciences (LUMHS) Jamshoro, Sindh Pakistan. The objective of the study was to assess the performance of the students' groups participated in PBL session on poster preparation and presentation based on criterion-reference. During the course of study of third module named "Musculoskeletal and Integument Module", the Problem-Based Learning (PBL) session was conducted on Theme "*Integument protects the body*" for three days. The self-assessment by the students and assessment of tutorial by the PBL tutors were done at the end of PBL tutorial process while the poster exhibition for the poster presentation was organized after four weeks. The methods used in collecting data are observation and questionnaires. The instrument used in this research is a questionnaire.

The "Good Academic Poster Preparation Guidelines" and "templates of posters" shared with PBL Tutors on day one of PBL session with the aim to orient the students on day 2 how to develop/create good academic poster (Table 1) and subsequently facilitate them for the poster preparation and oral presentation of poster. The tutors were oriented in this regard during development of Tutor Guide for this PBL session. The subject content of each individual poster was from the course covered in PBL based on objectives of the integument section of "Musculoskeletal and Integument Module" (Table 2). The subject content is also included in the Tutors Guide.

The poster of all ten groups A-J were fixed a day before the exhibition at venue (Corridor of ground floor of Academic Building of BMC). Each poster was assessed for three aspects: 1) "designing poster"; 2) subject content of each individual poster from the course covered in PBL and 3) oral (verbal) presentation of the poster by the student's group on explicit criteria. The scores allocated to "designing poster" was 10; subject content 10 and presentation 5. Two independent evaluators assessed each component of three components of assessment of poster i.e., designing poster", subject content and oral (verbal) presentation by the students. The average score of two evaluators of each component was calculated (Table 3-5). Based on the combined scores of three components, three posters were selected for number first, second and third prize. For the process of assessment evaluators of each component of the assessment were oriented two days before the actual assessment. Vice Chancellor (VC) and Pro VC, LUMHS and the faculty members of BMC and LUMHS visited the poster gallery viewed the posters, did enquiry from the students and appreciated them. The technique used to analyze the data is descriptive qualitative analysis, and quantitative analysis.

Table 1. Good Academic Poster Preparation Guidelines

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1. Start preparing as early as possible and permissible.
 2. Layout must be clean and consistent.
 3. Title must be short, self-explanatory draw interest and attention of the viewer.
 4. Key information must be readable from about 10 feet.
 5. Word count between 300-800 words depending upon self-explanatory presentable. tables, figures and graphics included. Don't overload poster with information.
 6. Text must be clear, understandable and to the point. Use brief and simple language.
 7. Make it easy to read by using bullets, numbering, sub-heading and headlines.
 8. Use of background, graphics, color and fonts must be applicable and effective.
 - a. Choose large font size. Use no more than three different fonts.
 - b. Use italics instead of underlying.
 - c. Use colors to highlight (2-3 not more).
 - d. Use preferable a light homogenous background.
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- e. Graphics must be visible. Graphics says more than words.
9. Add minimum reference (2-3); due acknowledgment must be mentioned.
10. Name of Group participants and institutional affiliation.
11. Check everything before printing or poster may be prepared for virtual presentation.
12. Prepare poster in power point (landscape or portrait) and then save it in pdf for uploading/printing.
13. Present in clear and logical way.
14. Poster size 5x3 feet in landscape orientation.

Table 2. The Objectives of Subject Content of Each Poster Covered in PBL Course

Poster No.	Subject	Objectives
1	Anatomy 1	<ul style="list-style-type: none"> • Define skin, what are the types of skin and differentiate between them. • Differentiate histologically between three components of skin structure. • Identify microscopically different layers of epidermis.
2	Anatomy 2	<ul style="list-style-type: none"> • Identify microscopically different parts of dermis and describe them. • Describe the keratinocytes and non-keratinocytes of skin.
3	Anatomy 3	<ul style="list-style-type: none"> • Define the lines of cleavage and their clinical significance • Identify and describe the skin appendages
4	Physiology 1	<ul style="list-style-type: none"> • Discuss overall functions of skin. • Describe the excretory function of skin • Describe endocrine function of skin
5	Physiology 2	<ul style="list-style-type: none"> • Describe photo-protection function of skin • Describe skin as sense organ • Describe normal flora of skin.
6	Biochemistry 1	<ul style="list-style-type: none"> • Describe the role of skin in thermoregulation • Describe the role of skin in homeostasis
7	Pathology 1	<ul style="list-style-type: none"> • Define Eczema • Define Atopic Dermatitis • Enlist the common causes of itchy skin, Eczema, Dermatitis
8	Pathology 2	<ul style="list-style-type: none"> • Describes pathological eruption/lesion of skin • Classify skin injuries and discuss them. • Define burns & classify them.
9	Pharmacology 1	<ul style="list-style-type: none"> • Define corticosteroids and the types of corticosteroids • Describe topical corticosteroids • Enlist the other groups of topical drugs
10	Pharmacology 2 + Forensic Medicine	<ul style="list-style-type: none"> • Describe drugs uses in eczema / dermatitis including atopic dermatitis. • Outline skin care in the atopic dermatitis • Describe the medico-legal importance of skin

Table 3. Assessment Criteria for Poster on “Designing Poster”

Criteria	Score on each criterion 2				Score given
	Excellent 2.0	Good 1.5	Fair 1.0	Poor 0.5	
<p><u>Ability to stand alone</u></p> <p>The poster should be able to stand alone as a clear communication of the topic/objectives without the team present.</p>					
<p><u>Balance</u></p> <p>The poster should be a balance of text, figures, and space. Excess text should be avoided - figures should</p>					

Criteria	Score on each criterion 2				Score given
	Excellent 2.0	Good 1.5	Fair 1.0	Poor 0.5	
play a dominant role in communicating the topic/objectives on the poster. There should be adequate space around text and figures to avoid a crowded appearance					
<u>Overall Visual Appeal</u>					
Color and font changes should be used appropriately. The use of too many colors creates an unprofessional appearance. Dramatic colors should be used only to illustrate dramatic points – overuse is simply confusing. There should be consistent use of color throughout the poster to represent the same concept - the colors should not be randomly switched. Due to red-green color-blindness, use of these colors to represent contrasting concepts should be avoided.					
<u>Legibility</u>					
The poster should be easy to read. There should be high contrast between the text and background. The background should not be busy and distracting. The resolution of the printed poster should be high enough that the text is clear and there is sharp detail on the figures. Avoid use of poor-quality micrographs and other images on the poster.					
<u>Quality of Graphics</u>					
The key concepts of the project should be diagrammatically represented. It is ideal if a single figure represents the entire concept. Figures should be well labeled and have clear legends.					

Table 4. Assessment Criteria for Poster on “Subject Content”

Criteria	Score on each criterion 2.0		Score given
	Adequate 2.0	Inadequate 1.0	
<u>Conciseness</u>			
The content of the poster should be technically written. It should take no longer than 10 minutes for someone to read the poster.			
<u>Flow</u>			
The poster content should follow a logical sequence. The reader should be able to navigate the poster with ease.			
<u>Appropriate and Relevant Content</u>			
Careful thought should be put into selection of poster content. Redundancy in the presentation of information becomes tedious and exists at the expense of other information.			
<u>Accuracy of Information Presented</u>			
The scientific content of the poster should be accurate. Models should be free of mathematical error.			

Criteria	Score on each criterion 2.0		Score given
	Adequate 2.0	Inadequate 1.0	
The poster reveals the literacy of the team. Grammar/Spelling Posters should be critiqued for spelling and grammar errors. Scientific names and mathematical units should be presented correctly.			

Table 5. Criteria for Assessment of Oral (Verbal) Presentation of Poster

Criteria	Score on each criterion 2.0		Score given
	Good 1.0	Fair 0.5	
Presenter greets people with good gesture Presenter is able to give a concise synopsis of poster Presenter is able to explain all diagrams and sections Presenter speaks fluently – i.e. doesn't stumble, leave sentences/thoughts hanging Presenter has questions to ask viewers			

3. RESULTS AND DISCUSSION

Results

The score obtained by the groups of students on the criteria “designing poster”, subject content” and “oral (verbal) presentation of the poster by the student’s group” is shown in the [Table 1](#).

Table 6. Group-wise Scoring of Assessment of Posters on explicit criteria

Group	Designing Poster			Subject Content			Presentation			Grand Total
	Score Assess or 1	Score Assess or 2	Average	Score Assess or 1	Score Assess or 2	Average	Score Assess or 1	Score Assess or 2	Average	
A	4.0	4.0	4.00	9.0	7.5	8.25	4.0	4.0	4.00	16.25
B	6.0	6.0	6.00	8.0	6.0	7.00	4.0	3.5	3.75	16.75
C	5.0	4.5	4.75	9.0	8.5	8.75	4.5	4.0	4.25	17.75
D	5.5	6.0	5.75	9.0	9.5	9.25	4.5	4.0	4.25	19.25
E	4.5	4.5	4.50	9.0	8.5	8.75	4.5	4.0	4.25	17.50
F	4.0	4.0	4.00	9.0	9.5	9.25	4.5	4.0	4.25	17.50
G	5.5	5.5	5.50	8.0	8.5	8.25	5.0	4.0	4.50	18.25
H	7.0	8.0	7.50	9.0	8.0	8.50	3.0	3.0	3.00	19.00
I	4.5	4.5	4.50	8.0	9.0	8.50	5.0	4.5	4.75	17.75
J	5.0	5.0	5.00	6.0	8.0	7.00	5.0	3.5	4.25	16.25

Overall, the performance students’ groups on “designing poster” was not good as half of the groups (five out of ten) scored less than 50% (less than 5.0 out 10.00). The main reason might be that the students never exposed to poster preparation before this. The additional reasons could be “students might not properly be facilitated by PBL Tutors”, “PBL Tutors might not properly understood this aspect during preparation of tutors’ guide” or “assessors might be too strict in assessment” and there might be “the possibility of subjectivity bias in assessment”. The performance of the students on “subject content” was excellent; two groups got more than 9 score (out of ten) six groups more than 8 score (out of ten) and two groups score were 7 (out of ten) as students studied subject content through self-directed

learning utilizing text books and other resources and collaborative learning (group work discussion) with facilitation of PBL Tutors in two days tutorial during PBL session. Studies supports that PBL promotes self-directed learning habits among students and enables students in collecting course content and concurrently enhances their critical thinking.

Discussion:

As a part of the assessment poster presentations facilitate students to demonstrate their learning and to reflect on it. Poster presentation as a part of assessment has been used in different disciplines and courses utilizing different methods of learning at different level of education but not for the assessment of problem-based learning (Norcini et al., 2018; Tarigan & Listyani, 2021). Problem-based learning cannot be implemented without the teacher developing a classroom environment that allows an open exchange of ideas (Bachtiar et al., 2018; Hamid et al., 2017; Nurmanita et al., 2019). Problem-based learning consists of presenting students with authentic and meaningful problem situations that can make it easier for students to conduct investigations and inquiries (Gholami et al., 2021; Rahayu & Fahmi, 2018). The objective of this study was to assess the performance of the students' groups participated in PBL session for poster preparation and presentation based on criterion-reference as criterion-reference method is fairly more valid, reliable and transparent (McNamara et al., 2010). Summative assessment was done for all ten students groups on each of the three aspects of assessment: 1) "designing poster"; 2) subject content of each individual poster from the course covered in PBL based on objectives of the integument section of "Musculoskeletal and Integument Module" and 3) oral (verbal) presentation of the poster by the students' groups on explicit criteria.

There was an outstanding performance of students' groups for oral (verbal) presentation of posters; seven groups obtained 4.25 score or above (out of 5) and three groups between 3 and 4 (out of 5). This is likely due to their enrichment in critical thinking skills, presentation skills and communication skills fostered during PBL sessions while group discussion, presentation in groups and presentation during seminar at the end of each PBL session. Students to get involved in group discussions is one of the essential elements of PBL, hence participating students learnt group dynamics and enhanced their generic skills such as presentation and communication skills (Vleuten & Schuwirth, 2019; Yonanda et al., 2019). The findings of previous studies also stated that PBL could improve students' skills (Diah & Riyanto, 2016; Kristinawati et al., 2018). Other findings also state that PBL can increase student activity during learning (Dupri et al., 2020; Wahyuni et al., 2017).

The limitations of this research are first, the exhibition of the posters and assessment of the posters done one month after other methods of assessments (the self-assessment by the students and assessment of tutorial by the PBL tutors) of PBL sessions. The gap might have impact on the performance of students. Second, only summative assessment of each group on three aspects for the poster assessment was done, so, the students groups didn't receive feedback on spot (formative assessment) which is very critical for ongoing learning. Third, the literature is not available on the poster presentation as a part of PBL assessment, so, the findings of this study cannot be compared. Fourth, the findings of this study cannot be generalized as this type of assessment is conducted in one PBL session in one of the five PBL sessions conducted in first year of medical undergraduate curriculum of only one medical school.

4. CONCLUSION

The summative assessment of poster preparation and oral presentation of poster by students' groups as a part of PBL assessment methods reveals below par performance of

students' groups on "designing of poster", excellent on "subject content" and outstanding for oral (verbal) presentation of posters.

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