



# PRIDE

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### Review Article

## Effective teaching methodologies for dentistry during covid-19 pandemic – A review

Tapasya Karemore<sup>1,\*</sup>, Vaibhav Karemore<sup>2</sup>

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### Original Article

## Simulation-based surgical skill training in internship program

Surekha Rathod, Dhanashree Ghoderao, Vrinda Kolte<sup>1</sup>, Nilima Budhraja<sup>1</sup>

Departments of Periodontics and Implantology and <sup>1</sup>Oral and Maxillofacial Surgery, VSPM Dental College and Research Centre, Nagpur, Maharashtra, India



# PRIDE

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## **MESSAGE FROM CHIEF EDITOR**



Hello all readers!

We all know that 21st-century learners are aspiring to a type of education that addresses their curiosity, promote creativity and expose them with inquiry-based approaches that answer their questions and lead to unique discoveries. Hence, by equipping learners with that type of education would lead to economic, technological, and scientific growth of the whole fraternity.

It is my privilege to introduce you to this issue of our DET journal which is themed on Project Based Learning. All the included manuscripts in the form of review, experiences and critical analysis of the subject by authors would definitely add to your knowledge and give an overview to practice this method of Teaching-Learning. Portraying, planning, role-distribution, and implementing projects are dual responsibility of both the teachers and the students. Also, their desire, readiness, and willingness to work out such projects are their responsibilities.

It is said that 'if you want to lift yourself up, lift up someone else'.....so let's lift up dental education T-L methods and build best competencies among budding health professionals!!

**DR MUKTA MOTWANI**

Chief Editor-PRIDE

Prof and HOD, OMR, VSPMDCRC. Nagpur





## EDITORIAL



GREETINGS!!!

Incorporating appropriate teaching-learning technology to enhance student's competency is a clear goal of all dental schools. Project based learning is one of such methods that helps to develop all-rounder and engaged student ready to perform even beyond classroom.

Project based learning (PjBL) is an instructional approach designed to give students the opportunity to develop knowledge and skills through engaging projects set around challenges and problems they may face in the real world. Educators have long valued the necessity of putting learners in real-life scenarios to help them gain a better understanding and knowledge of their learning. Project based learning has always been considered as an urgent revival of redirecting the instructional methods of teaching general skills to raise students' interests, critical thinking, and experiential learning and inquiry of learning important skills for day-to-day practice.

In project based learning, students work on a project over an extended period of time from days to months that engages them in solving a real-world problem or answering a complex question. As a result, students develop deep content knowledge as well as critical thinking, collaboration, creativity, and communication skills. Project Based Learning unleashes a contagious, creative energy among students and teachers.

New generations would need to have a positive climate to work co-operatively to generate ideas and to promote self-learning. Therefore, incorporating PjBL techniques in teaching dental vocabulary can foster student- to- student and student- to- teacher's relationship.

Happy Learning!!

Dr. Tapasya Karemore

Editor-PRIDE

Associate Professor, Dept. of OMR





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## PROJECT-BASED LEARNING IN BDS CURRICULUM

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**W**e, dental teachers are now in midst of teaching the two different generation of students, the millennials (born between 1981 and 1996) and generation Z (born between 1997 and 2012). It is a well-known fact that the minimal attention spans of these two generations which are 12 and 8 seconds respectively<sup>1</sup>. As teachers, we know how difficult it is to get the attention of such students during the teaching-learning activities. To enhance the learning by engaging these two generation students, one of the pedagogical tools is project-based learning.

Project-based Learning (PjBL) is a teaching method in which students gain knowledge and skills by working for an extended period to investigate and respond to an authentic, engaging, and complex question, problem, or challenge<sup>2</sup>.

PjBL, unlike 'doing a project' is not a different unit given to students. PjBL is a vehicle for teaching the planned learning objectives and is a part of the curriculum. It aims to teach team-working, communication, critical thinking, and problem-solving skills in a student<sup>2</sup>.

I share the example of such a PjBL module implemented in my institution. We allot a

small group of students to a mentor (faculty member) and this team will come up with a research project proposal. Based on the applicability and usability of the project, we map the required skill sets (example: software, statistics) and training needs and arrange such student training sessions.

The the Dental curriculum revision frequency may not be able to catch up the rate of newer technologies being introduced in the field of dentistry. Dental students might recognize newer skill sets such as artificial intelligence, smart toothbrush, augmented reality, virtual reality, teledentistry, computer-assisted design and intra-oral camera. They might explore training opportunities for these new technologies outside the dental school. In PjBL, we can provide such a learning opportunity where the students can choose the research topic based on their interest thus reducing the gap between the existing dental curriculum and the newer technologies.

As a policy decision, the team-members will not be changed during the entire project. The purpose of this decision is to make the student understand that such change of team-mates is not feasible in real-life situations, and they need learn to work with different types of people.



Some of these projects might need external communications such as seeking permission to visit a school or preparing a participant information sheet. If the project is a clinical trial, then the students need to communicate with the potential participants for the recruitment or convince them for additional dental visits.

Throughout the PjBL session, students have the freedom to voice and choice and redesign their project. Faculty members encourage students to reflect on what happened and what went wrong that led to redesigning the project. Students are encouraged to critique their and revise their work accordingly. Challenges or problems in project implementation is inherent to any of the projects and it is the responsibility of team to resolve any such challenges innovatively.

The role of the mentor in such PjBL sessions would be to help students in designing and planning the project, align the project to the curriculum and learning needs, nourish

the team spirit, monitor their activities and scaffold the learning. At the end of the project, we organise a 'student scientific conference' at the institutional level where each team has to present their project and would be assessed by independent judges for the best three projects. After the completion of the assessment, the faculty members engage the team and coach them to publish the project in peer-reviewed journals.

PjBL can help us to break the monotony of the lectures-seminars-clinical posting triad and has enhanced the soft-skills of students. These projects can help in obtaining seed-fund to further build the project by faculty members, thus enhancing the research innovations of the institution.

With the 'over-burdened' dental curriculum, the PjBL should not be an addition to the existing curriculum; rather be incorporated to achieve the existing learning objectives and thus can be a win-win situation to both the teacher and student.

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## PROJECT BASED LEARNING

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**W**ith learning being an every evolving exercise, project-based learning (PBL) has been leveraged as a model that organizes learning around projects. According to the definitions found in several PBL handbooks for teachers, projects are complex tasks and are based on challenging questions or problems and involve students in activities such as design, problem-solving and decision making. This may also include investigative activities and provide students with an opportunity to work relatively autonomously over extended periods of time. The end result may be realistic products or presentations. The model<sup>(1,2)</sup> is also popularly referred to as “intentional learning”<sup>(3)</sup>, “design experiments”<sup>(4)</sup>, and “problem based learning.”<sup>(5)</sup>

All such PBL activities are learning centric and it can be used as the pedagogy for an entire course or part of course or the theory course or the practical ones or combination of both theory and practical courses. PBL should be at the core of the curriculum and not be at its periphery and forms the central teaching strategy. It's the primary vehicles through which students learn the central concepts of any discipline via the project. There are instances where project work follows traditional instruction methodology in such a way that it serves to provide illustrations, examples, additional

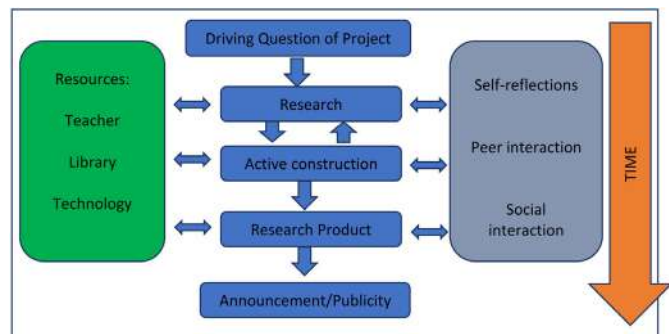
practice, or practical applications for material taught initially through other means. Such projects are focused on questions or problems that “drive” students to challenge themselves and encounter (and struggle with) the central concepts and principles of a discipline. The definition of such project (for students) must “be crafted in order to make a connection between activities and the underlying conceptual knowledge that one might hope to foster.”<sup>(6)</sup> While the projects may be built around thematic units or the intersection of topics from two or more disciplines, it's not sufficient to define a project. The questions that students pursue, as well as the activities, products, and performances that occupy their time, must be “orchestrated in the service of an important intellectual purpose”<sup>(7)</sup>

Project-based learning is an overall approach to the design of learning environments. Learning environments that are project-based have five key features as describe below:<sup>(7,8,9)</sup>

1. Students start with a driving question, a problem to be solved.
2. They explore the driving question by participating in authentic, situated inquiry processes of problem solving that are central to expert performance in the discipline. As students explore the driving question,

they learn and apply important ideas in the discipline.

3. Students, teachers, and community members engage in collaborative activities to find solutions to the driving question. This mirrors the complex social situation of expert problem solving.
4. While engaged in the inquiry process, students are scaffolded with learning technologies that help them participate in activities normally beyond their ability.
5. Students create a set of tangible products that address the driving question. These are shared artifacts, publicly accessible external representations of the class's learning.



Road-Map of the Project Based Learning

PBL was tried to build on four major learning sciences ideas such as active construction, situated learning, social interactions and cognitive tools.<sup>(10)</sup> Projects involve any students in a constructive which is a goal directed process that involves inquiry, knowledge building, and resolution. Investigations may be design, decision-making, problem-finding, problem-solving, discovery, or model-building processes. However, in order to be considered as a

project, the central activities of the project must involve the transformation and construction of knowledge (by definition: new understandings, new skills) on the part of students.<sup>(11)</sup>

Projects are student-driven to a significant degree and should not be teacher-led, scripted, or packaged. Laboratory exercises and instructional booklets are not examples of PBL, even if they are problem-focused and central to the curriculum. PBL challenge students and do not end up at a predetermined outcome or take predetermined paths. PBL incorporate a good deal more student autonomy, choice, unsupervised work time, and responsibility than traditional ways of instruction and traditional projects.

Projects embody characteristics that give them a feeling of authenticity to students with the characteristics incorporating topics, tasks, role play by students play, the overall context, collaborators, end products and their audience, and the criteria for product performances. PBL's focus on real-life challenges and authentic (not simulated) problems or questions with potential to implement solutions.

The approach incorporating PBL designs, student autonomy, collaborative learning, and assessments based on authentic performances help maximize students' orientation toward learning and mastery of the topic. Additionally, Project-Based Learning designers have built in additional features such as variety, challenge, student choice, and non-school-like problems in order to promote students' interest and perceived value.<sup>(7)</sup>

Research on Project-Based Learning carried out by the students can be in several forms to



- (a) make judgments about the effectiveness of PBL (summative evaluation),
- (b) assess or describe the degree of success associated with implementation or enactment of Project-Based Learning (formative evaluation),
- (c) assess the role of student characteristic factors in PBL effectiveness or appropriateness (aptitude-treatment interactions), or
- (d) test some proposed feature or modification of Project-Based Learning (intervention research).

Marx et al. (1991) summarized their findings under three headings: challenges, enactment, and change. Challenges grew out of difficulties teachers had in accepting the ideas that

- (a) effective collaboration among students requires more than involvement, it requires exchanging ideas and negotiating meaning;
- (b) effective use of technology requires that technology be used as a cognitive tool, not merely as an instructional aid; and
- (c) effective Project-Based Science requires not that all the concepts and facts of the curriculum are covered, but that students construct their own understanding by pursuing a driving question.<sup>(12)</sup>

Marx et al. (1997) delineate teachers' enactment problems as follows<sup>(12)</sup>:

| Problem                     | Resolution  |
|-----------------------------|---|
| Time                        | Projects often take longer than anticipated. In addition, difficulties that teachers experience in incorporating into guidelines are exacerbated by the time necessary to implement in-depth approaches such as Project-Based Learning. |
| Classroom management        | In order for students to work productively, teachers must balance the need to allow students to work on their own with the need to maintain order.  |
| Control                     | Teachers often feel the need to control the flow of information while at the same time believing that students' understanding requires that they build their own understanding.   |
| Support of student learning | Teachers have difficulty scaffolding students' activities, sometimes giving them too much independence or too little modeling and feedback.   |
| Technology use              | Teachers have difficulty incorporating technology into the classroom, especially as a cognitive tool.   |
| Assessment                  | Teachers have difficulty designing assessments that require students to demonstrate their understanding.  |

Challenges associated with Institution for the project based learning must be taken in consideration. Edelson et al. (1999) describes a number of practical constraints associated with the organization that interfere with successful inquiry. These factors include fixed and inadequate resources, inflexible schedules, and incompatible technology.<sup>(13)</sup>



These interventions, which are designed to support Project-Based Learning, have been referred to as scaffolding<sup>(14)</sup> or “procedural facilitation”<sup>(15)</sup>. However, it also has weaknesses such as a poor fit between the activities that form the day-to-day tasks of the project and the underlying subject matter concepts that forms the basis of the project. This in turn derails the projects on account of questions by teachers and students that are peripheral to the subject matter of interest. The solution, according to is to find ways for projects to center on “learning appropriate goals.” An appropriate strategy is to help teachers develop “driving questions,” i.e. questions that will ensure that students encounter and struggle with complex concepts and principles.<sup>(7)</sup> Barron et al. take the position that learning appropriate goals can be maintained by introducing explicit design requirements within the problem or project that prompt students to generate and pursue productive questions.<sup>(6)</sup> Different

context of PBL like, overall climate, beginning inquiry, directing inquiry, analyzing data and drawing conclusion, acquiring and presenting knowledge and skills and collaborating with others need to be emphasized in the interventions designed to improve the effectiveness of Project-Based Learning.

In the end, we can draw a conclusion that PBL, as instructional methods, has an inherent value for enhancing the students’ learning quality thereby claims such as learning higher-level cognitive skills. This increased capability on the part of students helps ion application of those learnings in a novel and problem solving contexts. PBL is an effective method for teaching students complex processes and procedures such as planning, communicating, problem solving, and decision making. The studies also demonstrate that these findings do not include comparison groups taught by competing methods.

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## PROJECT BASED LEARNING IN PROSTHODONTICS: “LEARNING BY DOING”

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“Knowledge is a consequence of experience”- Jean Piaget

As Dental Education is ever-changing, educational institutions have begun to shift away from traditional classroom learning toward Innovative Teaching-Learning. In traditional teaching, the instructor is in-charge of the learning environment. The teacher has power and responsibility, and they serve as both an educator and a decision maker in terms of curricular material and specified results. Traditional classroom teaching methods emphasised the teacher as the sole source of information. It promotes the use of a teacher-led method that emphasises face-to-face interaction, primarily between the teacher and the student.<sup>1</sup> Innovative teaching approaches are now welcomed by all teachers and students in Dental Institutes. Traditional learning provides a significantly more full learning experience since lectures are jam-packed with material, whereas project-based tutorials, which are mostly led by the students themselves, provide a far less comprehensive learning experience.

Project-based learning (PBL), one of these newest teaching tools, is active team-based learning in which students ‘*Learn by Doing*’. PBL is an instructional style that encourages students to learn by applying their knowledge and skills in a fun way. PBL provides chances for in-context learning

and the development of critical skills related to college and career willingness. In schools, business management colleges, and technical institutes, these tasks are routinely carried out. However, it is rarely employed as a teaching-learning aid in dentistry. So, there is a need to understand this method and apply it in dental curriculum.

Ramussen and Moffitt, defined Project-based learning as “*a systematic teaching method that engages students in learning knowledge and skills through an extended inquiry process structured around complex, authentic questions and carefully designed products and tasks*”.<sup>2</sup>

“Experiential Learning” / “Discovery Learning” are the terms that sometimes used interchangeably for Project Based Learning. We prepare students for the real world by assisting them in having authentic experiences by teaching students to be self-reliant, critical thinkers and creative capable of facing any obstacle they may face in the future. Project-based learning enhances long-term retention, problem-solving and cooperation skills, and students’ attitudes toward learning, according to some studies.<sup>3</sup> It is teacher’s responsibility to prepare learners for a project-based environment if we want them to succeed in life.

New generations seek a good environment



in which they may collaborate to produce ideas and learn on their own.<sup>4</sup> Project-based learning is more than just “doing a project,” it is “learning by doing.”<sup>5, 6</sup>

**Project based learning method in Internship:** Interns are assigned to the Prosthodontics department for 45 days throughout their internship. They are engaged in clinical work and are developing skills to engage them in creative teaching and learning techniques. Interns are educated about the tasks they will be doing during their posting time on the first day. Project-based learning is one of them.

**Work assignments are as follows:**

- Project topic selection based on a group's interests.
- Work is divided into teams based on the interns' abilities and interests.
- Allotment of time (10-15 days as per the project).
- Initial data was gathered by referring to books and publications and was accepted by the Intern in-charge.
- Every step is reviewed and approved on a daily basis.
- Evaluation - All team members present their project and it is evaluated.
- Best project is acknowledged at the end of internship.

**Advantages:**

Cooperative learning, problem-solving, peer and group coaching were some of the innovative strategies used in the Project-based learning approach. The students were really enthusiastic about sharing their knowledge and learning to work autonomously.

The following are some of the benefits of project-based learning:

1. It allows a student to work autonomously while demonstrating his or her ability.
2. It demonstrates the student's ability to put desired skills, such as research, into practise.
3. It improves the student's capacity to collaborate with others by developing good inter- personal skills.
4. It promotes problem-solving.
5. It makes self-directed learning easier.
6. It is frequently based on a real-life problem.
7. It starts with instructions and background information and finishes with a work presentation.
8. Uses periodic “check-ins” to encourage student-teacher connection.
9. Project-based learning is more effective.
10. Under the supervision of their teachers, students learn to comprehend the complete scope of the project and structure its implementation.
11. It develops their concept and creativity.
12. It identifies the actual knowledge.
13. Improves presentation skills and capability.

**Disadvantages:**

1. Some students are least interested in team-work and will require some time to adjust to working in a group.
2. When students are absent from project work, it causes problems for the other teammates.
3. Due to other activities, project work time has been extended on occasion.

**Conclusion:**

Research into learning methodologies has opened up new vistas in project-based



learning, which has piqued the interest of policymakers all over the world who want to implement it in their educational systems. It is the responsibility of the students to have the desire, readiness, and motivation to work on such projects. Project-based learning is more than just a method of instruction; it's also a method of collaboration. Students who learn to take responsibility for their own learning will lay the groundwork for how they will collaborate with others in adulthood.

Overall, project-based learning encourages students to apply a variety of abilities, such as teamwork, critical thinking, and peer/teacher engagement, to achieve a long-term multi-disciplinary objective based on real-life or real-world problems or obstacles. Inspiring and developing life-long learners is a popular and admirable goal for educators; so the Project –based learning must be incorporated in dentistry for the entire development of the student.

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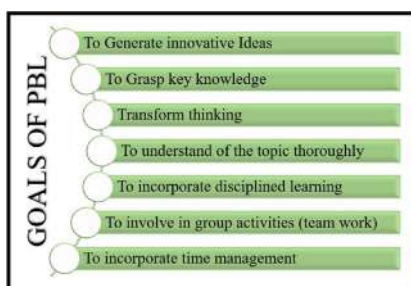
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## PROJECT BASED LEARNING / PROBLEM BASED LEARNING : A POSTGRADUATE STUDENT'S PERSPECTIVE

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**P**roject based learning / Problem based learning (PBL) is the process of learning through design, development and completion of projects. From teachers perspective, PBL is a method of structuring curriculum around projects to promote learning of prioritized academic content. These projects highlight the process of learning itself by offering authentic, inquiry-based activities for learners to access content, share ideas and revisit their own thinking.<sup>(1)</sup> Among educational innovations, the one labelled Problem-Based Learning (PBL) eventually became quite well-known and successful. The term ProblemBased Learning was originally coined by Don Woods, based on his work with Chemistry students in McMaster's University in Canada. However, the popularity and subsequent world-wide spread of PBL is mostly linked to the introduction of this educational method at the medical school of McMaster University.<sup>(2)</sup>

### What are the goals of PBL?



Goals of PBL

**Why it is important to know PBL or use PBL?** PBL is the unique educational strategy. Socrates made a point of questioning the students in order to activate latent knowledge, and the Chinese philosopher Confucius stressed the importance of involvement with a few often quoted lines:

Talk to me..... and I will forget  
Show me..... and I will remember  
Involve me..... and I will understand  
Step back..... and I will act<sup>(2)</sup>

Previously it is thought that PBL is useful in secondary and higher secondary schools, but nowadays it's use has been observed to be in graduates and postgraduate education too. It is very important for a post-graduate to know what exactly PBL is and how it works. Postgraduates will be the future lecturers and will teach the undergraduates. For effective teaching techniques thorough knowledge, good communication skills, innovative ideas and ability to make certain things understand are most important things. PBL helps the teachers to incorporate knowledge, motivation for learning without repetition of sameness of thoughts. The concept of PBL and its application is in curriculum of degree of bachelors of education (B Ed.). As a postgraduate student, I feel PBL should be included in the curriculum of postgraduation of every field so that



postgraduates will be able to teach same knowledge more effectively and efficiently.

### **How can we make use of PBL?**

- Use of PBL by performing icebreaking activities for undergraduate students, so that students may feel more relaxed without any burden of study.
- Use of innovative activities by asking the undergraduate students to make chart, draw diagrams and to make mnemonic for themselves of certain confusing things.
- Use of PBL in seminars by giving some research question and make others to think and find answers on that topic.
- In journal club, by performing some procedure in the article which is possible so as to retain the knowledge by visualizing the procedure.
- Same for clinical case presentations, posting a video of some procedure and discuss it.

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## PROJECT BASED LEARNING : A HEALTH SCIENCE STUDENTS' PERSPECTIVE

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**P**roject Based Learning (PBL) is an instructional methodology encouraging students to learn by applying knowledge and skills through an engaging experience. PBL presents opportunities for deeper learning in-context and for the development of important skills tied to college and career readiness<sup>(1)</sup>. Projectbased learning is understood to be a promising approach that improves student learning in higher education. PBL is a fun and exciting activity to work in groups and also independently. It focuses on development of leadership skills like communication, critical thinking, decision making, productivity and completion of projects effectively.

This ensures that the students are keeping up with academics and also getting these life skills that they will need to be successful in educational institutes and workplace. PBL allows the student to learn beyond the content, where they are able to apply their experiences or knowledge that they receive from other classes.

**Need of Project based learning:** In recent years, institutions of higher education have been trying to provide students with both hard skills, namely cognitive knowledge and professional skill<sup>(2)</sup> and soft skills such as problem-solving and teamwork<sup>(3)</sup>. However, these skill related goals are

not easy to be achieved as traditional learning has been playing a prevailing role where teachers are “the transmitter of the knowledge” while students act as “the receptor of the information.”<sup>(4)</sup> As a result, it is difficult for students to fully involve in educational practices, which may lead to a superficial understanding of disciplinary knowledge. Besides, universities, and research universities, in particular, are more focused on the development of students’ research skills rather than professional skills or transferable skills. Thus, creating a gap between what students learn at the university and what they need in the workplace<sup>(5)</sup>. In order to change this scenario, it is suggested that students are provided with the opportunity to participate in real problem-solving and knowledge building in authentic professional contexts. One such innovative way to achieve this goal is through project-based learning. In Chen & Yang’s (2019) review, the effects of PBL and classroom-based teaching on students’ academic achievement in primary, secondary, and tertiary education were compared. In this study, PBL specifies a learning process in which students are engaged in working on authentic projects and the development of products. The results demonstrated that PBL had a more positive impact on students’ academic achievement than direct teachers’ instruction did<sup>(6)</sup>.



**Advantages of PBL:** Advantages of PBL over traditional approaches include improved integration of basic and clinical skills; improved communication, teamwork, and selfdirected learning; and improved motivation and enjoyment of working together on a problem. For example, for professors in health education, this integrated approach gains when linking clinical cases with basic science, by preparing students to solve clinical problems based on basic principles and previous knowledge. Furthermore, skills learned and experienced in the process of PBL, such as teamwork, delegation, and the use of relevant literature to solve a clinical problem, are important for professional work after graduation<sup>(7)</sup>.

Learning to work in the PBL group is another important life skill. Group learning also provides chances for students to connect, exchange ideas and knowledge, and respect different views and opinions. Students may learn best by teaching each other, and working in groups provides them with the chance to polish their knowledge and obtain it in other ways. Furthermore, learners gain more knowledge in groups than in other teaching set ups, perhaps because they are more engaged and involved in the learning process<sup>(8)</sup>.

**PBL Characteristics:** Traditional teaching approaches often follow a linear path, whereby the tutor orders what is to be done. She/he presents detailed information about a particular topic and students then solve the given problem. In PBL, the problem is presented first and students then work in small groups to solve it.

PBL has been developed and applied in a wide range of disciplines. The core model of PBL (Barrows,1996) is composed of the following six characteristics.

Learning is student-centred. It improves student participation and ability to retain knowledge. Students develop problem solving skills which boost his/her performance in academics.

Learning occurs in small student groups through which students are motivated towards common goal & work together to support each other's learning.

Tutors are facilitators or guides unlike traditional teaching where students follow tutors' instructions.

Problems form the organizing focus and incentive for learning. In PBL for health and medical education, patient and public health problems are presented in various formats, such as written case scenarios, simulated patients, computer simulations and video clips. This approach challenges students in practice, highlights the importance of learning, and motivates them to learn; they try to understand the problem from the perspective of other subjects, such as basic sciences. Thus, the problem requires them to focus on integrating knowledge from many disciplines to obtain particular information.

Problems are a vehicle for the development of problem-solving skills. For example, in health education, a patient problem is introduced in the same way as in real life. The outline of the problem should allow the students to ask questions to the patient, perform physical examinations and request laboratory tests. Students should obtain the results of these investigations as they work through the problem.

New information is achieved through self-directed learning. Students are likely to learn and gather expertise through their own studying and research, as professionals do. Students work together,



discussing, reviewing, comparing, and debating what they have learned in the course of this selfdirected learning<sup>(9)</sup>.

In conclusion, from all the evidences supporting the effectiveness of PBL, I think it should be included in dental education as through PBL, students learn to become associates in the teaching and learning processes; they take responsibility for their learning, successfully work as part

of a team, cope with new and changing circumstances, and acquire lifelong learning skills. Therefore, PBL can improve the critical thinking of dental students, teaching them to analyse and solve real problems, which prepares them for their future careers. This remarkable development in teaching approaches has improved the effectiveness of teaching in dental education institutes.

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## RELEVANCE OF FACULTY EVALUATION: A STUDY BASED ON ML WEB DISCUSSION

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**Background:** The assessment of performance plays a key role in understanding the outcome of the performance. In medical evaluation system it is essentially critical, as it impacts the outcome of education in terms of medical graduates and post graduate doctors who deal with human lives. Teachers play a vital role in grooming medical students by impairing knowledge, skill and competencies; thus periodic evaluation of faculty becomes essential. The assessment of performance of medical faculty in the medical science provides a basis to analyze their potential and competence to justify their role as medical teachers. Thus, evaluation of faculty has been considered as an integrant of any appraisal process<sup>1</sup>. It is also needed to meet the high requirements for professionalization in medical education, increasing liability, the professional competence<sup>2</sup>. However, what should be the criteria for evaluation of faculty needs to be further defined and understood from the faculty's perspective. In context to this, the present study was undertaken to know the view of faculty from different medical colleges with different cadre, regarding faculty evaluation and different aspects of it.

**Material and Method:** Present study is retrospective study, based on the online ML web discussion of Foundation for Advancement of International Medical

Education and Research (FAIMER) participants conducted on the topic "faculty evaluation".

**Study Place:** Bharati Vidyapeeth (Deemed to be University) Medical College and Hospital, Sangli; and All India Institute of Medical Sciences Patna, Bihar.

**Study tool:** Questionnaire and online discussions

**Statistical Analysis:** Percentage of frequency

All FAIMER participants involved in online discussion were included in the study, while those who were not involved in participation were excluded from the study. Total 27 FAIMER fellows participated in the present study.

Result:

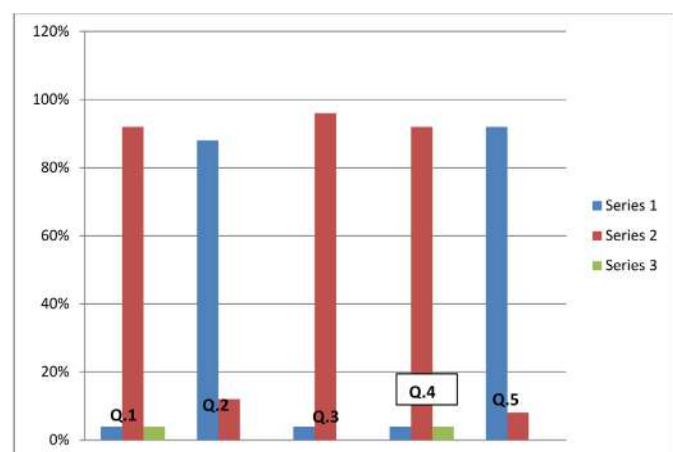
| Sr. No. | Question   | Responses |     |          |
|---------|--|-----------|-----|----------|
|         |  | Yes       | No  | Not sure |
| 1       | Along with the heavy academic schedule, faculty evaluation based on research projects, workshops, CME and conferences; seems to be wired job chart | 04%       | 92% | 04%      |
| 2       | I completed my basic teaching technology course by my own interest   | 88%       | 12% | --       |



| Sr. No. | Question  | Responses |     |          |
|---------|---|-----------|-----|----------|
|         |   | Yes       | No  | Not sure |
| 3       | Do you feel disappointed when your work is being assessed by students?  | 04%       | 96% | --       |
| 4       | Does it an uncomfortable or a forceful to you, to be a member of different committees and extracurricular activities. | 04%       | 92% | 04%      |
| 5       | Does self appraisal mandatory in your own University?   | 92%       | 08% |          |

**6 - Other Remarks:**

- a) Faculty evaluation will promote personal and professional aspects of the teacher and at the same time it will improve quality of medical education.
- b) Faculty evaluation should be done in manner that is conducive process.
- c) 360 degree evaluation and positive criticism will help.
- d) Faculty evaluation help in improving the performance of the teacher
- e) Faculty evaluation will develop personal and professional growth.



Q.1 Along with the heavy academic schedule, faculty evaluation based on research projects, workshops, CME and conferences; seems to be wired job chart

Q.2 I completed my basic teaching technology course by my own interest

Q.3 Do you feel disappointed when your work is being assessed by students?

Q.4 Does it an uncomfortable or a forceful to you, to be a member of different committees and extracurricular activities.

Q.5 Does self appraisal mandatory in your own University?

Series 1 – Yes

Series 2 – No

Series 3- Not sure

**Discussion:** Faculty evaluation is generally considered to assess the academic performance of faculty members, including all activities related to teaching, research, administration and services. Faculty evaluation recognizes the faculty who need to improve their professional and teaching behaviors; helps to promote educational scholarship and identify teaching excellence<sup>4</sup>. Online discussions in the present study considered all these aspects of faculty evaluation. Although the major discussion involved the role of professional activities in faculty evaluation. All participant faculties were in agreement that for professional development assessment, portfolio of the faculty is an important tool to display the quantity and quality of the educator's work in a format that makes it easy access to evaluators. Different perspectives regarding the medical faculty evaluation are discussed in depth during the online discussion.

Majority of the faculty accepted that the workshops regarding teaching technology had a great impact and definitely helped them to transform as a teacher. Their teaching techniques and delivery of



contents improved immensely which was also reflected by student's performance in the examination. Thus the faculty members had keenness to pursue such teaching technology training course periodically.

Among all the faculties, 96% of the faculty denied that they did not feel disappointed when their work is being assessed by students. This indicated that faculty knew the approach of faculty evaluation is for evaluation of student's academic achievement and it is one of the main functions of the improvement of student's learning<sup>4</sup>.

Most of the faculty denied that it is uncomfortable or a forceful to them, to be a member of different committees and extracurricular activities. Such responsibilities and activities are part of institute's establishment, thus they play an important role in evaluation process. This revealed that the faculty was aware about the relevance of these activities as a part of their profession; and evaluation of these activities for their professional growth.

Keeping update with the changing curriculum as well as the needs of society was accepted by majority of faculties. That's why they opined that along with heavy academic and administrative schedule, faculty evaluation based on research projects, workshop, CME, conferences is creditable.

The major focus of discussion revolves around the portfolio and its use for faculty evaluation. 360 degree feedback<sup>1</sup>, scholarship, professional activities when accompanied with portfolio; it will be a effective tool for faculty evaluation. As a matter of fact portfolio really plays a versatile role in faculty evaluation. Portfolio can include narrative section on activities like professional development, social

services, co-curricular and extracurricular activities; student's, peers and self evaluation. Participant faculty agreed that portfolio offers a means for faculty to arrange, present and review on their acquirements in these areas of teaching, scholarship and service. So portfolio can be helpful to support an application for up gradation, tenure or merit services.

There was an agreement among all the participant faculties about the provision of information by portfolio in context of teaching activities and concrete evidence of their effectiveness. Portfolio not only arranges but also in touch with professional growth and accomplishment of faculties for the given period of time being reviewed<sup>5</sup>. Portfolio provides reflection of carrier and important events of faculties. It is a perfect vehicle to exhibit the quality and quantity of the educator's work in a format that makes it easily accessible to assessors. Portfolio can be a group of things; from classroom teaching to interrogative services, awards and distinctions. With recent advances in information technology, e-portfolio can be created.

Mostly all the universities from where these faculties were, implement self appraisal system. Such type of self assessment of their won teaching and other activities is highly efficient for further academic improvement and enhancement<sup>6</sup>. hence self appraisal became as one of the component of faculty evaluation system and most of the faculties routinely do this.

**Conclusion:** Most of the medical faculties were aware about and ready for evaluation. They provided important information which was discussed through ML web discussion. The medical faculty well versed in all responsibilities they have to follow to produce a competent physician which



will be responsible for health of society      serve for society.  
and with good professionalism he/she will

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## AN OVERVIEW OF PROJECT BASED LEARNING (PBL)

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**Abstract:** This articles includes the application of smart teaching ways which focuses on problem based learning (PBL) making it more efficient way of enhancing the cloud of base forming skills and conceptualization. It includes the trajectory of adoption of PBL from the historical adaptation to the modern way teaching customs. This also talks about the long term goal acquisition and integration of the already existing conventional ideas. PBL embeds students' learning processes in real-life problems. After its successful implementation it is now expanded in the areas of law, education, economics, business, social studies, and engineering and It encourages students to develop skills that can be useful for their future and in practical life within a team environment.

**Key words:** problem base learning, curriculum method, team work, problem solving, student centre learning

**Introduction:** With budding advancement and acquisition of new adoptive skills outside the customary classroom set, Project Based Learning (PBL) transforms the conventional way of learning and directs the learner down a path of in depth research for a specific theme. This methodology of learning provides a basis for comprehensive development, is proven to be most effective teaching framework for various courses. (Eduardo de senzi,

2017...)). The implementation of PBL forms a multidisciplinary background for students which focuses on current teaching methodologies used in degree programs under certain domains.

The Uniqueness of PBL model is identified by a set of criteria which are central to the curriculum focus on questions that drive students to encounter the central concepts and principles of discipline involving students in a constructive research; are student-driven to a significant degree within the boundaries of their courses. (Chua et al., 2014).

With reference to advantages of the PBL approach, learning by means of a project is likely to increase motivation (Fernandes et al., 2014), and give the students a sense of satisfaction, it is helpful for developing long-term learning skills (Edstrom & Kolmos, 2014), to develop profound, integrated understanding of content and process, it allows students learn to work together to solve problems and it promotes responsibility and independent learning (Chau, 2005; Chua et al., 2014; Frank et al., 2003).

**Brief History of PBL:** Problem-Based Learning was first developed in medical education in the 1950s by the educators at McMasters University in Canada in the 1970s. Around the same time, other medical schools, such as Michigan State



University in the United States, Maastricht University in the Netherlands, and Newcastle University in Australia were also developing problem-based learning curricula (Barrows, 1996). This emphasis was blamed for failing to indulge students with clinical problem-solving and lifelong learning skills (Albanese and Mitchell, 1993; Barrows, 1996). In the 1980s, the wider spread of PBL in the United States was accelerated by the GPEP report (Report of the Panel on the General Professional Education of the Physician and College Preparation for Medicine). This report made recommendations for changes in medical education, such as promoting independent learning and problem solving, reducing lecture hours, reducing scheduled time and evaluating the ability to learn independently (Barrows, 1996). These recommendations heavily supported the implementation of PBL in medical education, later a number of medical schools, such as the University of Hawaii, Harvard University, and the University of Sherbrooke in Canada, assumed the more arduous tasks of converting their entire curriculum to PBL. In the 1990s, more medical Colleges, such as Southern Illinois University, Rush, Bowman Gray and Tufts, adopted PBL as their primary instructional method (Aspy et al., 1993; Barrows, 1994). Since its first implementation several decades ago, PBL has become a prominent pedagogical method in medical schools and health-science-related programs throughout the world, including North America, the Netherlands, England, Germany, Australia, New Zealand and India. In India it was first introduced in 2008 progressed and was implemented in medical colleges by 2014.

**Goals of PBL:** It was implemented to increase motivation (Fernandes et al.,

2014), and give the students a sense of satisfaction, it is helpful for developing long-term learning skills (Edström & Kolmos, 2014), to develop deep, integrated understanding of content and process, it allows students learn to work together to solve problems, promote responsibility and independent learning (Chau, 2005; Chua et al., 2014; Frank et al., 2003). PBL also contributes to bringing the classroom close to the profession through the acquisition of knowledge while solving practical and real cases closed to the professional world (Terron-Lopez et al., 2016). In fact, PBL works to integrate and apply (Song & Dow, 2016): (i) structured new knowledge covered in the course, (ii) knowledge learned in other courses, (iii) prior life experiential based knowledge and (iv) new self-taught knowledge.

**Characteristics of PBL:** Problem-based learning is an instructional methodology that is, it is an instructional solution to learning problems. It is a methodology with the following characteristics:

- **Aligned Thinking and Learning** - It is problem focused which is intentionally designed to solicit thinking around desired standards, content, ill-structured problem & skills which will help them to focus on their thoughts and leads to the authentic integration of language skills and processing information from multiple sources, allows learners to demonstrate their understanding of content knowledge through an end product (e.g., an oral presentation, a poster session, a bulletin board display, or a stage performance)
- **It is student centered** - students individually and collaboratively assume responsibility for generating learning



issues and processes through self-assessment this enables the students to create concrete products, showing that the students have successfully gained knowledge (Hargis, 2005). Tutor are facilitators who support and model reasoning processes, facilitate group processes and interpersonal dynamics.

- **Relevant analysis** - The project guides teaching & learning using purposeful formative and summative assessments. Meaningful assessment can come in many forms including formal and informal close or open ended questions.
- Problem-based learning is based on **constructivist assumptions**.

#### Various way to implement PBL:

**Student and tutor roles** - the students become the initiators of their own learning, the inquirers and problem solvers during the learning process and they are no longer passive information receivers

**Group project** - interdisciplinary-based project through a series of open-ended questions can be applied that enabled the interviewer to build upon and explore the answers to each question. Project could be performed in a number of ways (e.g. a video presentation, a play, a showcase, a website, a chart, a card board or a PowerPoint presentation).

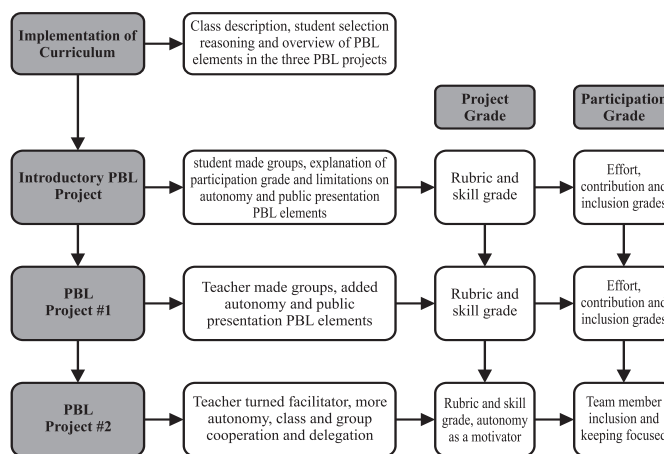
TV program and videotaped interviews with other students on campus.

**PBL tutors** helps in (1) facilitating group work (2) role modeling (3) providing feedback (4) imparting information (5) supporting students' professional development.

**Curriculum design** – include lecture-based cases, case-based lectures, case method, modified case-based, problem based and closed-loop problem-based

**Use of Technology in PBL** - Distance Learning with use of Web-based technology system was utilized to help instructors organize courses (syllabi, groups, projects, and student reports) and to facilitate electronic communication (discussion sessions between instructors and students), as well as provide online resources development, such as ingredients for writing problems, inspiration for problem design, and information for solving problems.

**Use of Multimedia** - (virtual PBL) incorporated multiple modalities, including digital video, images, text, questions, and text boxes to present problem scenarios and facilitate the PBL process.



Clark, Bethany A.2017. Implementation of PBL Curriculum Flowchart

**Assessment of PBL:** It can be done by using scenario-based multiple-choice questions, extended matching, essay questions (cognitive knowledge) and OSCE (for assessing clinical knowledge and skills) there are outcome-oriented instruments, such as the progress test (Van der Vleuten et al., 1996), essay exams, oral and structured oral examinations, patient-management problems, clinical reasoning exercises (Wood et al., 2000), problem-analysis questions (Des Marchais et al., 1993) and



standardized patient-based tests, as well as process-oriented instruments, such as the triple-jump-based exercises (Smith, 1993), Medical Independent Learning Exercise (MILE) (Feletti et al., 1984), the four step assessment test (4SAT) (Zimitat and Miflin, 2003), formative assessment (Neufeld et al., 1989) and tutor, peer and self-assessment work in groups throughout many of the projects and assignments and where their final products will be publicly shown to the school during events.

**Limitations of PBL:** Most of the time students are busy with PBL, so that they face the problem to achieve good scores. PBL demands complete engagement and involvement of the students but for all the students' it can be difficult at times. Participation can be delayed due to some students are unable to understand the problem. Students are not able to understand the idea of open-ended problem. Students' may require abstract knowledge to create and finding the solution of the problem. For supervising PBL activity teachers should be trained so that they can give focus on chalked out about the problem. Like designing questions, providing and helping material question and answer, series PBL exercise demands constant monitoring and note taking. Limitation of resources at every household could pose an underpinning of a successful PBL Project.

**Conclusion:** Introduction of PBL will be an

innovative effort which will shift passive learning towards active learning. Project-based learning is an increasingly popular method for teaching students to solve problems, think critically, master science and engineering principles and learn teamwork, collaboration, communication, and project management skills. This will help the student's to multiple intelligence in order to support differences among individuals in terms of student-centered learning and 21st century skills, that is an important new concept in education is that literacy is always changing and need to adapt to new methods of teaching. Instead of just teaching students how to read and write, teachers need to prepare the students for a world beyond the classroom in order for them to become successful in all aspects of their lives. Also, leadership and responsibility provides lots of opportunities to take responsibility and exercise leadership-skills important to future employers. Teaching students responsibilities will strengthen their work ethic when they have a job or career. It will continue to help them succeed in the job market and learn even more skills in the future. The main objective of this approach is to improve the overall competency and skills of the students. Key advantage of this method is to familiarize students with real world problems and improves their confidence. It also enhances networking skills, value of team work and appreciation of interdisciplinary approach.

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## TEACHING CELL BIOLOGY TO DENTAL STUDENTS WITH A PROJECT-BASED LEARNING APPROACH

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**Abstract:** Although the discipline of cell biology (CB) is part of the curricula of predoctoral dental schools, students often fail to recognize its practical relevance. The aim of this study was to assess the effectiveness of a practical-theoretical project-based course in closing the gaps among CB, scientific research, and dentistry for dental students. A project-based learning course was developed with nine sequential lessons to evaluate 108 undergraduate dental students enrolled in CB classes of a Brazilian school of dentistry during 2013-16. To highlight the relevance of in vitro studies in the preclinical evaluation of dental materials at the cellular level, the students were challenged to complete the process of drafting a protocol and performing a cytocompatibility assay for a bone substitute used in dentistry. Class activities included small group discussions, scientific database search and article presentations, protocol development, lab experimentation, and writing of a final scientific report. A control group of 31 students attended only one laboratory class on the same theme, and the final reports were compared between the two groups. The results showed that the project-based learning students had superior outcomes in acknowledging the relevance of in vitro methods during biocompatibility testing.

Moreover, they produced scientifically sound reports with more content on methodological issues, the relationship with dentistry, and the scientific literature than the control group ( $p < 0.05$ ). The project-based learning students also recognized a higher relevance of scientific research and CB to dental practice. These results suggest that a projectbased approach can help contextualize scientific research in dental curricula.

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| Sr. No. |                      | Strengths of the study   | Weakness of the study   |
|---------|----------------------|--|---|
| 1       | Title                |  | The title of the study does not convey the aims of the study. The title itself should provide an insight into what the reader is expected to read after going through the article. In this case the title does not provide any idea about the study conducted. On the contrary, it suggests a too generalized an approach of teaching methodology to be implemented for Dental students.                        |
| 2       | Background           | Background of the article is well written and describes the current methods being used and their disadvantages.                | In the abstract section, a structured abstract is easier to understand rather than a paragraph.<br>There is no mention about the grouping criteria in the abstract section.<br>The abstract section should also mention about the methodology adopted and the parameters evaluated by the authors.<br>Conclusions drawn from the manuscript need to be very specific and in tune with the title of the article. |
| 3       | Objectives           |  |   |
| 4       | Method               | The methodology adopted by the authors is appropriate and conveys the required details.  | A statement on sample size determination would have been appreciated.   |
| 5       | Results              |  |   |
| 6       | Statistical analysis |  | A separate section on statistical analysis is desired with the details of statistical methods and tests with a mention of the specific tests being used for the parameters evaluated.   |
| 7       | Discussion           | The discussion section is nicely written with a detailed account of the observations of the authors and the reasoning thereof. |   |
| 8       | Conclusion           | Conclusion part is appropriate.  |   |

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