


AQ2 AQ1

# Problem Based Learning in Medical Education: Handling Objections and Sustainable Implementation

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**Abstract:** The introduction of problem-based learning (PBL) in 1969 is considered the greatest innovation in medical education of the past 50 years. Since then, PBL has been implemented in different educational settings across virtually all health professions. However, some PBL schools gradually faced resistance from academic staff who were more familiar with traditional teacher-centred curricula. At times this has resulted in reversion to tradition or compromise whereby PBL is implemented within a lecture-based curriculum. Resistance can also emerge in a traditional school when a PBL curriculum is being considered for implementation. One of the first signs of this erosion is doubts about PBL raised in the form of objections or criticisms. This perspective review describes eight objections raised to assert why PBL is inferior or untenable. The background to each objection is provided together with evidence-informed rebuttals derived from professional practice and the published literature. Best practices are discussed for sustainable management of a PBL-based curriculum. A well-implemented PBL curriculum with appropriate and cost-effective infrastructure, training, teaching-learning activities, and assessment will position schools to harness the full benefit of PBL in training medical and health professionals.

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**Keywords:** problem-based learning, lecture-based curriculum, educational philosophy, facilitator, traditional lectures

## AQ4 Introduction

In 1969, the medical school at McMaster University in Canada implemented a new curriculum philosophy which became known as problem-based learning (PBL). Since then, over fifty years of educational research have borne out its theoretical bases, worldwide efficacy, and continuing relevance.<sup>1-3</sup> However, the average faculty's view of PBL is more likely influenced by its implementation at their institution, which may not be all positive. The greatest challenge for an innovative teaching-learning approach such as PBL is the risk of it being dismantled, or more commonly sidelined by lecture-based teaching, after the founders or designers leave. The first three Malaysian medical schools that employed PBL from inception of the school all reported resistance from faculty after the first student cohort had graduated.<sup>4-6</sup> An older school that incorporated PBL drifted back to tradition for a time when key faculty left.<sup>7</sup> For this same reason a special PBL programme in China was terminated.<sup>8</sup> In Norway, faculty opposition against a new full PBL curriculum resulted in implementation of a partial version.<sup>9</sup> Examples of failed PBL curricula were also reported in New Zealand, Singapore and the Philippines.<sup>10,11</sup> The first sign of resistance is usually the emergence of doubts, apprehensions, and criticisms about PBL. In this perspective review, 8 objections to PBL (Table 1) are presented and refuted. The objective is to enable PBL practitioners to handle objections while providing recommended best practices to underpin a sustainable PBL curriculum.

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## Learning Must Be by Lectures

There is no pure PBL curriculum that is without lectures.<sup>12</sup> PBL rose partly because traditional lecture-based curricula did not promote knowledge retention but the students were memorizing, then forgetting.<sup>13</sup> A study on the value of lectures in a PBL curriculum found lectures not useful for knowledge transmission but helps clarify the problems and the place of the unit in the whole curriculum.<sup>14</sup> Best-practice exemplars of Asian PBL programmes have been observed to

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AQ5 **Table I** Eight Objections to PBL

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| <ol style="list-style-type: none"> <li>1. Learning must be by lectures</li> <li>2. Students only go through the motions of PBL</li> <li>3. They will not cover all they need to know</li> <li>4. Student directed learning leads to errors</li> <li>5. Our students are too immature to use PBL</li> <li>6. The PBL facilitators are incompetent</li> <li>7. The PBL problems are not improved and PBL content overlap with lectures</li> <li>8. A PBL curriculum is too resource- and time-intensive</li> </ol> |
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limit lectures to only 4 or 5 hours a week.<sup>11</sup> The hallmark of a PBL curriculum is that most teaching-learning activities are compatible with the PBL philosophy of active, contextual, or collaborative learning which will foster deep understanding, **long-term** knowledge retention and retrieval. In a PBL curriculum, students see the problem first while other classes are coordinated with the problem, but allowing sufficient time for self-directed learning.<sup>15</sup> The limited lectures in a PBL curriculum are not used for “covering” core content but other specific purposes, and are preferably interactive.<sup>16</sup> 45

In the days when print was scarce, lecturing was the only viable method of teaching.<sup>17</sup> However, students attending a typical lecture cannot sustain their attention for too long. Attempting to reflect upon what was heard will stop further listening. Charismatic lecturers that can inspire and hold attention are few and far between. **Hence**, the most common activity in the lecture hall is to taking notes, without much thinking. Lecturing assumes knowledge is a quantity that can be transmitted. The reality that students typically experience is more consistent with the constructivist notion that knowledge cannot be transferred by a teacher, but has to be constructed by the learners themselves.<sup>18</sup> Lecture gives sometimes justify the effectiveness of lecturing by the ability of students to pass the exam. However, if the students do not actively study the notes after the lecture, much of the contents would be irretrievably lost. When lectures are excessive, some students will not be able to catch up. In contrast, students benefit from active and collaborative approaches like PBL because learning occurs in the classroom and with help from peers. A large meta-analysis of undergraduate STEM students comparing traditional lecturing versus active learning found active learning methods to produce higher scores and lower failure rates.<sup>19</sup> A commentary on this study stated that any college or university teaching its STEM courses by traditional lectures is providing an inferior education to its students.<sup>20</sup> 50

Students taught by lectures prepare for exams typically by going over the notes repeatedly. This is surface learning which does not foster knowledge retention after the exam. PBL learning begins by using prior knowledge to understand a new problem. Cognitive psychology shows new information is retained best if it can be organized around known reference points.<sup>21</sup> PBL’s self-directed acquisition of knowledge is active learning as it involves intentional engagement and purposeful observation of knowledge resources with critical reflection on its applicability to the problem.<sup>22</sup> In contrast to passive hearing of lectures, active learning produces longer retention through generating distinctive sensorimotor associations that encode the event in the memory for later retrieval.<sup>23</sup> After self-directed learning, PBL students reconvene to put together their independent findings - this active process of elaboration helps transfer information into long term memory.<sup>24</sup> Additionally, PBL trigger problems based on authentic workplace scenarios should aid the transfer of knowledge to the clinical context, compared to learning from the textbook. 55

In tandem with the rise of PBL in the last 50 years, education has shifted to learner-centred approaches, competency-based and outcome-based learning. One result is that faculty are no longer dispensers of information but take the role of advisors, mentors and guides.<sup>25</sup> Approaches such as PBL (and not lecturing) are used where the program learning outcomes include future ready graduates with 21st century skills such as creativity, problem solving, communication, teamwork, and lifelong learning. Our students grew up in the internet era where a vast amount of updated knowledge is readily available. The most important skill they need now is not listening to lectures or rote learning, but the ability to ask the right questions, acquire knowledge from the right sources and apply it to the problem. In the words of education reformer John Dewey: “If we teach today’s students as we taught yesterday’s, we rob them of tomorrow”.<sup>26</sup> 60