



Strategic linking between Research and Teaching: A Backbone of Active Learning Environment

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Abstract: Research-led teaching incorporates and benefits from the teacher's disciplinary research to improve student learning and outcomes. From the perspective of the learner, the research-led teaching leads to a better understanding of the knowledge bases of disciplines and professions, including research methods and challenges; development of intellectual abilities, enhancement of employment skills, and zeal for lifelong learning; experience with independent research and investigation; and increased participation in their studies and application in the real world. This intervention was applied in a first year PG course. It was felt from the discussions with the previous batch of students that they were not comfortable in the one of the topics. For this, a suitable course module needed to be designed to help the students understand about the need and benefit(s) of this problem. The course instructor feedback, course content surveys along with the direct assessment analysis showed tremendous involvement level of the students.

Keywords: Research led teaching. Research, Teaching. Research teaching links

DOI: [10.48047/ecb/2023.12.si4.995](https://doi.org/10.48047/ecb/2023.12.si4.995)

1. Introduction

The students need to tell what they need to know. They also need to be engaged in 'How to Learn?' Finally, they need to be encouraged to seek and discover new things (Hodge *et. al.* 2007). 'Research-led teaching reflects and makes use of the teacher's disciplinary research to benefit student learning and outcomes' (Trowler & Wareham 2008). This will definitely make them in being a better person wherever they serve which will ultimately help in making our nation great. The course module needs to be very carefully designed, and proper action plan needs to be devised and cautiously implemented for improving the learning curve of the class. The curiosity needs to be aroused among the learners for making them more attentive and serious in the course. This even improves their self-belief and zeal to excel in life.

2. Literature Survey

Research integrated teaching refers to the whole package of learning in terms of disciplinary concepts, theory and application has to be carefully designed to fit in the research expertise into the students' learning experience and meeting the course learning outcomes. As per Brew (2006), research and inquiry engage undergraduates meaningfully in higher education and prepares them for a twenty-first-century world of work where knowing how to inquire and critically evaluate knowledge is of increasing importance. Trowler and Wareham in 2008 stated that *Research Integrated Teaching* reflects and makes use of the teacher's disciplinary research to benefit student learning and outcomes. There can be following two school of thoughts related to research led teaching:

Fitting Research to Teaching

It emphasizes development of students as active researchers which is of great value (Hounsell 2002). But research led teaching should not be reduced to making research fit our teaching and learning. Research led teaching should also affect development of researchers.

Fitting Teaching to Research

Research led teaching may also involve designing curriculum and policies to support development of researchers. Not only, how we can make our research applicable to teaching and learning but also how we can make our teaching applicable to research.

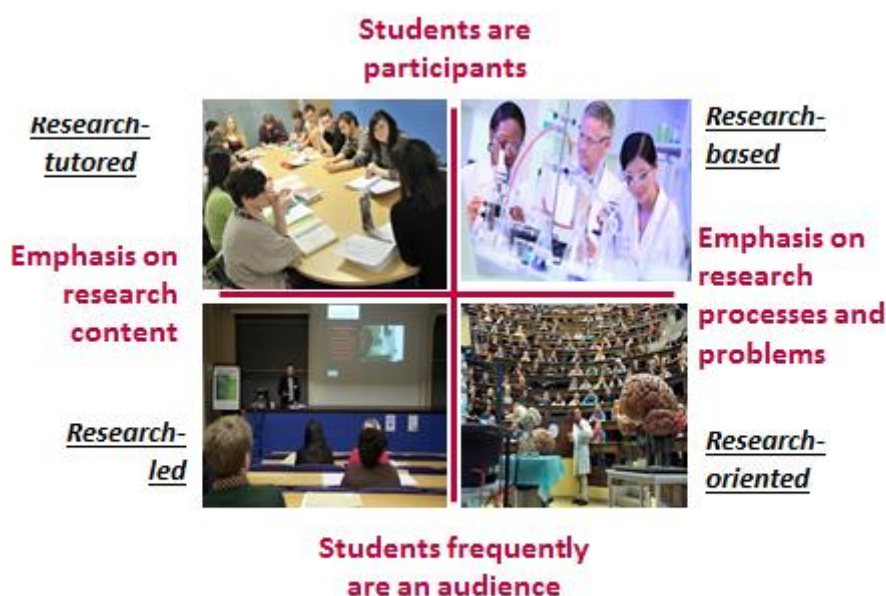
Both the directions of fit mentioned above are of equal importance for the passing of technical know-how to our younger generations.

Based on the Healy's research teaching nexus model reported in 2005, one can easily identify the following research-teaching links:

1. Emphasizes research content or Research processes and problems
2. Students are treated as audience or participants
3. Teaching is Teacher-focused or Student-focused

The Healy's model about various research teaching links is shown in Figure-1. It defines that there are four main ways of engaging undergraduates with research and inquiry:

- Research-led:
learning about current research in the discipline;
- Research-oriented:
developing research skills and techniques;
- Research-based:
undertaking research and inquiry;
- Research-tutored:
engaging in research discussions.



Curriculum design and the research-teaching nexus (Healy, 2005)

Figure-1: Healy's Research-Teaching Nexus

3. The Intervention

Student's journey can be broadly classified into the following four paradigms:

Paradigm	Approach
Teaching	Telling students what they need to know
Learning	Engaging students in learning how to learn; emphasis on learning what they need to know
Discovery	Encouraging students to seek and discover new knowledge
Creation	Encouraging students to apply their knowledge to create something novel

To improve the overall engagement of students in a course, sometimes, they need to be exposed to one's own research to arouse curiosity in their minds. This will definitely improve their involvement in the course.

I felt from the discussions with the batch of students who passed out in 2015 were not comfortable in the 'Grounding/Earthing Grid Design' topic as very limited content is available in the text books. For this, in addition to applying my technical know-how or research experience (Hounsell 2002; Griffiths, 2004; Healey 2005; Healey & Jenkins 2007; Trowler & Wareham 2008), I had to consult my M.E. thesis supervisor who is active in the consultancy work. For this, a suitable course module needed to be designed to help the students understand about the need and benefit(s) of this problem. This was actually a challenge because not much has been covered in the prescribed text books. Even the research papers addressing this problem (Arora *et. al.* 1993 and Seedher *et. al.* 2005) are also very limited. So, international grounding standards (IEEE Standard 80-1986 and IEEE Standard 80-2000) were consulted for this.

To ensure proper learning, the number of problems has been solved in the class. Also, the students were given sufficient number of numerical problems in the tutorial sheets (Brew 2006; Brew 2006; Hanney 2013). To ensure that the students are satisfied with the course delivery method and contents, a 'Course Instructor Feedback Form' was designed. Each student in a class was asked to fill this form, given below:

Before going in for the assessment of the students (Indirect and Direct), I decided to take the feedback from the class answering the following questions:

1. This topic is informative and helpful in developing your technical know-how.
2. The course instructor referred some international standard(s) related to this topic

Kindly, mention the name of this/these standard(s).

3. The information given by the course instructor will be useful to you in the field job.
4. The course instructor made you feel free to ask questions in the class.
5. The course instructor communicates effectively in the class.
6. The course instructor shared his research experience related to this topic.
7. The course instructor shared some additional knowledge with the students besides the content given in international standard(s) related to this topic.
8. The course instructor explained the objective(s) of this problem/topic.

9. The course instructor helps the students to solve some design problem(s) in class.
10. The course instructor includes some real life problems related to custom power in the tutorial sheet(s)/assignment(s) of the course.
11. The course instructor allows you to be active in the classroom learning.
12. The course instructor listens and understands student's point of view. He may not agree but students feel understood.

Average Weighted Score of 4.8 on a scale of 5 for the Course Instructor Delivery in the class was obtained.

Then, another survey form 'Student Feedback Form' was designed to assess the comfort level of the class in this topic, given below:

After this, an indirect measurement of student's understanding about the topic was carried out. For this, the feedback from the class was taken by answering the following questions:

After going through the classes of the above-mentioned topic:

- 1) I know the objective(s) of the custom power.
- 2) I have the knowledge of the terminologies related to the power quality and custom power.
- 3) I have the ability to analyse and propose a suitable custom power device for mitigation of various power quality problems in a distribution network.

Average Weighted Score of 4.53 on a scale of 5 for Indirect Measurement was obtained.

STUDENT EVALUATION: Direct Measurement

The whole class was divided into seven groups, and were given independent design problems. They were given ten days' time to complete and submit their assignments.

Self Assessment:

From the two surveys that were carried out, it is clear that the students were pretty happy and satisfied with the contents, and the manner in which the whole of the topic was covered in the class. The comfort level of the students in this topic when measured through direct and indirect methods was also very encouraging. Students had really done very well in their assignments which at the end is very satisfying for me. ***Average Weighted Score of 4.58 on a scale of 5 for Direct Measurement was obtained.***

5. Summary and Conclusions

This paper has examined the impact of strategic linking of one's own research experience into the learning experience of the students for active engagement of students. This approach is definitely going to bring the cultural shift in the student's behaviour and the work culture. This would also help to improve the overall market perception of university's or institute's branding. From the surveys conducted and the performance evaluation of the class, it is clear that the class seems to have understood this topic very well. This is really very satisfying for me as a facilitator. Therefore, it can be safely concluded that any goal set by the teacher for establishing the *Active Learning Environment through Research led Teaching* is achievable in the class.

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