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An Investigation of the Role and Effectiveness of Research-led Teaching in Higher Education

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Abstract-*The paper studies the role of research led teaching in higher education. The research has been conducted amongst the first year engineering undergraduate students with an aim to initiate the minto the realm of scientific and scholarly research. This would prepare them to design projects at later stages in their degree. An activity on technical report writing was revised to familiarise the students with academic readings. The students were made to look for academic literature on the topics assigned and come up with summaries of the articles. The specific topics were chosen based on these summaries. Surveys were conducted by the students which were later compiled into reports. This activity ensured that the students were better equipped to conduct research before going in for projects in their respective streams of engineering. The case drew upon various theories and models to explain the need to change from 'teaching based research' to 'research based teaching'.*

Keywords- *Higher Education, research integrated learning, research-teaching nexus, Curriculum, Teaching efficiency, learning outcomes.*

I. INTRODUCTION

Educational institutions have started focusing greatly on students centred learning techniques in order to provide them holistic and meaningful learning. The focus on experiential learning is an extension of student centred learning which values the first hand experiences and students' reflection on those experiences in various learning situations. The efforts are made to increase students' active participation at various teaching learning levels rather than letting them passively imbibe the knowledge provided by the teacher. Students are not only expected to participate actively in their learning, they are encouraged to reflect upon their learning as well as the teaching strategies and the curriculum as well. Teaching is no longer teacher centred. Focus now has shifted to student centred learning techniques. These teaching learning methods put the students in the centre stage by providing them the environment most conducive for their learning. Such methods advocate increasing students' stake in the educational activities by letting them decide the content as well as the pace and time of their learning. Research led teaching is another teaching learning strategy that has garnered the interest of academicians all over the world owing to difference of opinions regarding it's feasibility and effectiveness. The academicians who have tried and tested this method of teaching and learning have observed different results under different conditions. Some scholars find the strategy to be working better in some specific disciplines; a few others however, advocate the use of this teaching across the disciplines. The academicians have shown a positive response towards the concept and the benefits that

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this nexus may possibly generate. This positive connect is ascribed to the belief that both education and research are internally connected (Nybom 2003).

Research-led teaching (RLT) may be defined as teaching that informs and enriches course content with the research in a particular domain and simultaneously inculcates research skills in students (Holbrook & Devonshire,2005). Therefore RLT not only aims at enriching the existing teaching material with the latest research in a specific field, it also expects to initiate students in to the process of conducting research. It is considered to help students in their subject specific courses, share the global research knowledge and develop in them a critical approach to knowledge (Neumann 1994).Similar opinions are shared by McLean and Barker (2004), who note that research-led teaching serves a dual purpose of providing enquiry based learning and development of research interest and capacity in students. RLT is successful only when the students are capable as well as interested in studying the concepts outside that are not included in their textbooks. Also, the research in question may be complicated enough for the students to understand during their lectures. Smeby (1998) observes that such nexus of knowledge sharing is successful at postgraduate level, however some studies find it effective at under graduate levels, especially on Humanities and Social Sciences courses (Robertson, 2007). Academicians therefore suggest including those concepts for the purpose that are relatively easier for the students to understand.

Healey has suggested four different methods to carry out RLT. These are as follows:

1. Research tutored, in which the students are taught about research taking place in their respective fields.
2. Research led, where using research findings to enhance students' understanding about their subjects
3. Research oriented, which educates students about different methods of carrying out research
4. Research based, in which students are directly engaged in carrying out research.

It may be noted that such changes in teaching and learning can take place only if there is support from the decision making authorities. As all these methods are applicable at different levels, they require a modification in the curriculum as well as the educational learning outcomes. Brew (2003) has also classified research-led teaching into three categories which are:

1. Teaching rooted in discipline specific research.
2. Teaching focusing on developing research related skills in learners.
3. Teaching research that investigates students' effectiveness in learning.

Educational institutions have started giving a lot of importance to research. Although researchers contend that teaching effectiveness has a positive relation with the research, however the co-relation has been found to be negligible by various studies. Despite the differences in opinions, research led teaching is expected to connect research with teaching in the classrooms to make learning better. It is expected that teachers who excel in research will be able to use that research in their teaching. The desired results however, may be expected only when there is a connection between the research a particular teacher is involved in and the course he\she is teaching. This connection is hardly taken in to consideration while hiring faculty for teaching a particular course.

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Our perception and understanding of our surroundings is continuously being modified by the knowledge based in research which makes it necessary for the institutes of higher studies that they help students grasp these changes through education (Barnett, 2000). The significance of research in higher education is evident from the fact that research has become one of the most important parameters while hiring teaching faculty. Studies have shown negligible connection between research output and teaching efficiency (Feldman, 1987). The above mentioned arguments seem valid enough and highlights the importance of research in an appropriate manner. However, it is a common observation that the course contents are not revised quite frequently by the universities worldwide. Thus it becomes difficult to draw a parallel between the current research and the prescribed curriculum for the students. Despite the controversy regarding the connection between teaching abilities and research aptitude, the research remains the deciding factor even for promotions

II. BACKGROUND OF THE STUDY

Effectiveness of education may be measured by observing if a student is meeting pre-determined learning outcomes (Fung, 2017). This is especially applicable to the Indian education system of schools that focus on learning outcomes, the measurement of which is done with the help of grades or percentiles. Students take up engineering as a career option at a very young age of 17-18 with almost 12 years of rigorous schooling backing them up. The school education gives them an extremely strong theoretical background through sequenced programmed instructions. While this method has been criticised by many, yet it is not without benefits. A strong theoretical background is tested at regular interval which prepares the students for the struggles that lie ahead in terms of extreme competition for admission to premier institutes as well as lucrative employment.

The above system, however, has next to nil space in the curriculum to expose students to hard-core scientific research. At best, research is limited to designing models based on different principles of sciences or a demonstration of certain physical or social phenomena that they have observed. In fact, even the faculty in schools is not oriented to research. This is evident from the selection criteria that do not demand a doctoral degree as an essential qualification for selection of faculty for schools, particularly for teaching at the senior school level (CBSE-ITMS,2017).When these students enter professional institutes they are expected to apply scientific research to various projects that they undertake especially from the second year onwards. This requires learning by research, particularly the identification of gaps in existing contributions.

III. INITIATION INTO SCHOLARLY RESEARCH-THE CONTEXT

All first year students of Thapar Institute of Engineering and Technology, Patiala(TIET), irrespective of the discipline, have to study a course titled ‘Professional Communication’. The broad objective of the course is to train students for the placement as well as the corporate positions later on in their life. In keeping with this objective, students are imparted various skills like oral and written communication, effective use of non-verbal cues in different communication contexts, etc. Keeping in mind the technical nature of the engineering programme,

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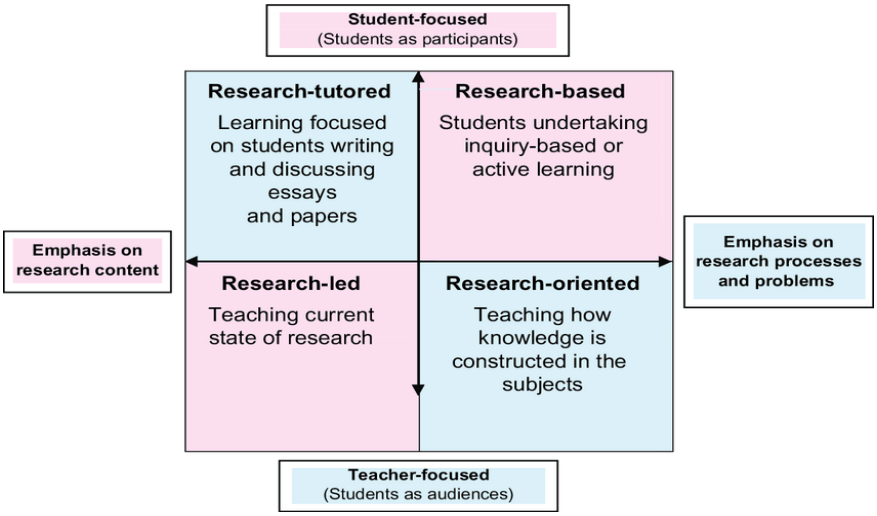
technical writing is also taught in the form of report writing and proposals. The aim of technical writing is to familiarise the students with the project/technical reports that they undertake second year onwards.

As stated earlier, the engineering instructors expect the students to indulge in scientific readings before they are assigned different projects. Hence, the imbalance between teaching and research needs to be corrected by initiating first year students into scholarly and scientific research. This endeavour has received a lot of support from pedagogical literature that looks at the value as well as the challenges inherent in achieving this balance. Students can increase their knowledge about research by either being an audience (RLT) or by participating in different research projects themselves (Zamorski, 2000). This discussion was enhanced further by Healy and Jenkins(2005) who put forth four methods of conceptualising the research-teaching relationship in higher education.



IV. (HEALY AND JENKIN, 2005)

Healey's model has been extensively used by the researchers and academicians. His organisation of the variables suggested by Griffiths (2004) was based on twin planes; (i) emphasis on the research and (ii) students as audience/participants. There have, however, been doubts raised regarding the participatory role and eventual learning of research skills in students. The order of importance of different quadrants is another related issue. It is observed that research based quadrant is given preference over the others (Jiang & Roberts, 2011).

If the four quadrants are seen as a continuum from 'research led' to 'research based', Healy's model can be used in various courses across disciplines in Universities to achieve the much required balance between research and teaching. Wuetherick and Turner (2006) based their model on a single dimension extending from teacher focus to students focused. If we compare their model with that of Healey (2005), we find equivalence between research outcomes transmitted and research led as proposed by Healey. Similarly, research process transmitted can be considered equal to research oriented. However, the two models differ in the kind of activities that can be covered under research based. For example when students engage in existing research, it can be done through teachers or department research. Problem/enquiry based teaching which can also be considered another form of students'

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engagement in research. Writing project dissertations and publishing outcomes of research can be considered under students as researcher's quadrant.

V. INDUCTINGRESEARCH INTO TECHNICAL REPORT WRITING MODULE

To expose and initiate students into scientific research, technical report writing, an assessable activity, with the first year undergraduate students was chosen. As it existed, students were given topics and they had to collect information and present it in the form of a report. While this activity had analysis component, it did not give students any knowledge about scholarly research. If we view Healy and Jenkins (2005) research categories, 'research-led' is the genesis and 'research-based' as the culminating point. Students were being asked to conduct research-based activity without 'research-led' activity.

Phase-1

Students were asked to write a small essay that answered the following questions;

1. What is research?
2. Any previous experience with research activity? What was it?
3. How was the experience?

Out of 74 students who wrote on these questions, none had any idea about formal research. The responses were expected e.g. 'experimenting', knowing something deeply by reading 'books', finding out details and facts about any particular thing, etc. Scholarly readings were not mentioned at all. Experiences narrated were personal endeavours that gave "philanthropic satisfaction". Meyer, Shanahan and Laughksch (2005), noted the conception of students regarding research in teaching. They found out that students saw it as means of collecting data/information and discovering truth. They also conceived it as a process that leads to a deeper understanding of the concepts and initiates them into reinterpretation of the world through enquiry.

Phase- 2

The students were divided into teams and asked to propose 2-3 broad areas for report writing. Once that was done, the team was asked to search and come up with 4-5 latest scholarly articles on the area. The fact that students were not even aware of the scholarly data bases like Google Scholar, was a revelation that further strengthened the requirement for this activity. The students were asked to summarise the articles. The article summaries provided them specific focussed topics for report writing.

The students conducted research on the topics assigned. Once the data had been analysed instructions on organising the data were provided to the students. Different chapters of the report were explained to the students. Though this was already being done, yet the rationale was clearer this time. As an additional assignment, students were asked to go through the project reports submitted in their respective departments by post graduate students. This enabled the students to formulate the report on similar lines.

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Phase- 3

Feedback regarding the activity

On the submission day, the students were again asked to give their feedback on the additional element incorporated and their learning. aOut of the 74 students, an overwhelming 69 found it 'useful', 'an eye-opener', 'enhanced knowledge', and 'very important'. About five students found the article reading 'boring', 'exhaustive', 'heavy' etc.

VI. RESULTS

This activity of initiating students into searching and reading scholarly articles gave them an insight into formal scholarly research. This also enhanced the knowledge of a particular concept or phenomenon. The quality of the reports submitted, when compared with the previous batches, was much superior in terms of surveys, analysis and discussions. The above activity achieved much more than a simple initiation into research. It connected the disciplines, since engineering courses would take benefit of this learning. It also connected students as they worked in teams. This facilitated dialogues, interactions and exchange of learning across diverse discipline because the students are put together in their stream of choice only in the second year. This is a simple but an important step towards the Connected Curriculum Model proposed by Dilly Fung(2017) which aims to strike a balance between teaching and research. Of the 12 dimensions of connectedness proposed by her, this simple activity can meet at least 6 of them.

VII. CONCLUSION

The major focus of the higher education institutions emphasising the role of RLT is the amalgamation of research and teaching in ways that assure that research of the teacher has direct positive impacts on students' learning. According to Trowler and Wareham (2008), the nexus benefits students' learning and outcomes. Research led teaching is possible and effective only when the curriculum and policies are designed in ways that facilitate the process. Also, research integration should complement the existing curriculum and thereby students' and researchers' learning rather than making it difficult for them. Since school education does not offer any avenue for scholarly research, the first year students should be initiated into research in every subject by readings from good journals. This will make them more prepared for the project based activities/ modules in the higher years.

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