

THE PhD is a unique degree in that it is not focused on acquiring more knowledge. A Master's essentially provides more in-depth knowledge of a subject. But doing a PhD is oriented around research.

Due to this focus, it is often believed that creating new knowledge is a PhD's main goal. While this is definitely part of the training, the main objective of doing a PhD is to become a competent researcher, who can conduct independent research in the chosen area.

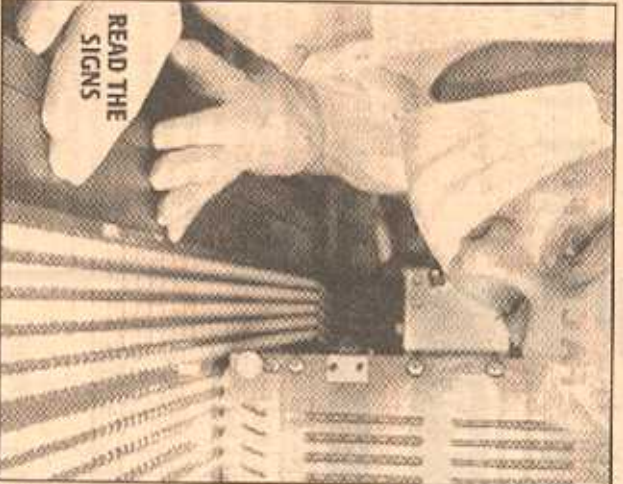
If we go by the assumption that the purpose of a PhD programme is to produce competent researchers, then the research done during a PhD is primarily for contributing towards this goal and the nature and sophistication of the output is less important. What is important is to learn to properly formulate a problem and apply suitable techniques to produce results that further peoples understanding of that problem.

The ability to conduct research in an area requires in-depth knowledge in that area, knowledge regarding related areas, and the experience of working on research problems, the problems whose outcomes are unknown. To develop these critical abilities, most PhD programmes have three components in their structure: some course work to provide breadth of knowledge; methods to develop the depth of knowledge in the chosen area of study; and a thesis that provides the experience of working on research problems. Through these components, a PhD candidate should expect to develop the following abilities, which form the foundation of a career in research.

BREADTH IN THE DISCIPLINE: EXPERTISE in a vertical area in which the PhD candidate can say "I am an expert in this". This would be an area in which he has full knowledge of what is known, what is missing etc. De-

The Research Edge

A PhD degree is structured around three core skill sets, preparing candidates to be competent researchers. Pankaj Jalote examines



veloping this expertise requires the ability to search for relevant work done in an area, as well as the ability to critically read and understand research papers, reports and monographs, and appreciate the subtle or complex issues that may be involved.

Ability to identify research problems: This is one of the most important abilities for a researcher. It requires a good knowledge of recent developments in the area, and the ability to create a bigger picture and see how different work fits together, and what might be missing. Formulating a problem property is half the research done. In fact, most PhD candidates spend

much of their time defining the problem. This skill is strengthened as the person develops the subjective ability of judging results and problems. This skill is also needed by a PhD person as a member of the research community, where one is called upon to review other peoples work.

Ability to actually do the research: Behind every research there is some new idea, some hypothesis, which forms the foundation of the research work. But doing research is much more than getting an idea. The idea has to be developed using established paradigms of scientific research, through which the researcher shows the value of the idea. Spending time grappling with research issues, actually doing research, and studying others research work can help develop this ability. That is the main reason why doing independent research is always a part of a PhD programme.

Ability to write and present the results: This is very important and very difficult. Not only are issues of communication involved, but one has to convince a group of peers (who review it and later read it, if published) that the work is worthy of their time, the results have been put in context, the value is clearly articulated, etc. Publishing research results has been a time-honoured tradition and benchmark, and is perhaps the only reliable way to subject a research work to

scrutiny and use by others.

Developing these abilities should be the objective of a PhD programme. Note that we have not discussed the actual research results. That is the outcome of developing these abilities. A PhD degree should result in some research results, which should be peer reviewed and published. Without this, there is no effective method to demonstrate that the ability to do research and communicate the results has been developed.

However, in an overall research career, it is possessing the above abilities that is more important, particularly if one wants to work in industry where needs may change and where the problems that a researcher works on may be different from the ones chosen in a PhD. For a career in academics, however, the actual results are equally important as the evaluative processes of research work done during the PhD. All of these abilities are important to become a competent researcher. It should be clear by now that many of these skills cannot really be taught but are learned largely through commitment, dedication, and perseverance. This makes the PhD mostly a self-driven and self-taught degree, with the PhD programme and supervisor gently aiding the process. The programme and supervisor help mostly in creating an atmosphere and environment in which the scholar is motivated to excel.

Hence, while doing a PhD, the scholar should be self-motivated and committed, and willing to work hard and long on problems. Research is often a lonely business (except in disciplines where group activity is common) and the PhD is a preparatory step for a career in it. Research is a tough career but with the development of these skills, it can become easier and more satisfying.

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