

■ EDU GUIDE ■

UNDERGRADUATE THESIS

What students should know

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For an education system that vastly relies on bookish knowledge and exam-based evaluations, research at the undergraduate level poses itself as a massive hiccup for most Bangladeshi university students. Up until that, a student's entire idea of education is based on grades and CGPA. Since research requires extensive self-study, motivation, and acquiring new skills and applying them accordingly, university students have to reshape their entire learning process in a short time, which poses new challenges along the way.

When students first start diving into the world of research, they're often overwhelmed by the wide variety of choices, not knowing where to start.

"Usually, what happens is that the thesis supervisor assigns you a topic, and you search for gaps and work on it based on your narrow range of knowledge. But, during my first research experience, the process wasn't so organised," said Mohammad Junayed Hasan, a graduate of North South University (NSU).

"We had to read random research papers on random topics, understand the gaps in those papers, and search for relevant datasets. Since we were not experts in those topics back then, we had to propose solutions which, after months of working, turned out to be not so effective for a top-tier conference or journal."

The leap from traditional textbook-based studies, where the contents are arranged for the students, to the vast number of resources in research is tough to handle.

"Pursuing a thesis is more difficult than completing the traditional undergraduate courses that we do," said Anindya Alam, an undergraduate student at Bangladesh University of Engineering and Technology (BUET). "There are no fixed textbooks. The information, theories, and ideas you need for the research are scattered all over the internet, and you don't have anyone spoon-feeding you those ideas. Initially, you have little idea about the subject matter at hand. The overwhelming number of scientific journals you have to study to gain insight into what could potentially be your thesis topic sends you into a rabbit hole of unfamiliar jargon. The worst part is that your research partners might be as confused and lost as you are."

For your thesis, your supervisor plays an important role. A helpful and experienced supervisor can lead you the right way efficiently and help you shape your research into publishable material for journals and conferences.

"I have worked with five supervisors during my undergraduate studies, and my experience with each one of them is vastly different from the other in their approach," said Junayed. "Some will read your draft paper thoroughly and provide constructive feedback, whereas others might not reply to your emails for months. There are serious inconsistencies in how your experience might be."

"I was lucky enough to have an outstanding supervisor and an engaging research group," said Akib Mohammad Khan, a graduate of Islamic University of Technology (IUT). "The team conducted weekly meetings and shared updates on our progress. This helped us get into a habit of reading relevant research

papers, which is the most important aspect of starting any research. My supervisor provided us with tips and tricks on how to skim through a paper and pick the most important points. He also guided us on writing an effective research paper, including how to properly conduct a literature review, how to show our proposed methodologies, and illustrate experimental results clearly."

In almost all STEM undergraduate programmes, lab projects are a key ingredient in the syllabus which requires the students to work with their partners and learn using new tools to solve different problems to reach the final output. However, Akib believes that the thesis requires a much broader perspective.



"Projects allow us to build things by envisioning an idea and building upon it from our knowledge and existing technologies. A thesis is where we have to think more critically from a wider prospect and funnel it down to a fundamental problem that we look forward to solving. Your thesis topic has to spark some interest in you, otherwise it will feel difficult for sure," said Akib.

Most Engineering students step out of academia after graduation and look for jobs. For these students, an internship in a company in exchange for the undergraduate thesis programme might be more feasible and effective for their careers.

"There can be an alternative where one can choose an internship and a final-year project instead of an undergraduate thesis," said Syed Emad Uddin Shubha, a graduate of BUET and currently a research assistant at NSU. "However, universities shouldn't only focus on the job market. Both thesis and internship can be included in the curriculum."

"It is already a practice in a number of top universities across the world," said Dr Md Zunaid Baten, an Associate Professor at the Department of Electrical and Electronic Engineering (EEE), BUET. "In

countries like the USA and Singapore, for example, it is a well-established culture because large companies are already active in that region, and they've successfully created an ecosystem that supports such internship programmes. But unfortunately, the intercommunication between universities and industries isn't still strong enough in our country for conducting a credit-exchange-based internship programme like that."

Although industry jobs aren't dependent on the undergraduate thesis, according to Akib, the skills acquired in the process do help you in the long run. He said, "The skillset you procure throughout your

undergraduate thesis journey makes you stand out in any setting. Presentation skills, working in a team, reporting to your supervisor, critical thinking, and unique problem-solving abilities – these are essential skills in any working environment."

"In BUET, we want to ensure that each student is introduced to the process of conducting undergraduate research," said Dr Baten. "Until and unless students are introduced to the world of research, they won't be equipped with the knowledge to decide whether they want to pursue a career in research or not. The undergraduate thesis programme is their opportunity to explore this option and then make an informed decision accordingly based on their preference."

Even though the undergraduate thesis programme is an extremely common practice in Bangladesh, it still has room for improvement. A major area of concern for the students is the short period by which they have to complete their research.

"I think it would be great if supervisors could take university students under their wing in their second or third academic years and slowly groom them for their research," said Anindya.

"Students should be involved in more research ventures where they can observe and learn about the field gradually with more experienced personnel helping them out rather than two inexperienced undergrads trying to figure things out themselves."

"Some professors have unrealistic expectations from an undergraduate thesis and, in turn, overwhelm their students while it is meant to encourage independent study," said Akib. "Students should also be allowed more time and made aware of their thesis work halfway through their undergraduate studies. This would allow them ample time to explore the various fields in that discipline, narrowing down on a particular topic and not be burdened with time constraints."

The leap from the conventional Bangladeshi education system to academic research is a scary one. However, universities can make it easier for their students by proper guidance, increasing the timespan allotted for research and guiding them to the world of academic research gradually from the first or second year rather than jumping into it in the final year. Incentives and research funding at the undergraduate level along with proper supervisory guidance can be effective in creating a fruitful academic research culture at the undergraduate level.

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