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AN ANALYSIS OF PROGRAMMING SKILL DEFICIENCIES IN COMPUTER SCIENCE GRADUATES- A SURVEY

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ABSTRACT

By far, one of the largest hurdles for computer graduates is acquiring and refining strong programming skills and yet those are mandatory in the fields of dynamic IT. Universities and independent colleges can put in all the effort they want, but there is a knowledge gap between what a student learns in academic institutions and what one expects from an industry employer. This research delves into the gaps by surveying 25 experienced IT professionals in senior positions in their organizations in Pune city. The survey instrumented test on various aspects of the transition a graduate has to undergo while moving to the IT industry, the list of key skills and domain knowledge to be successful in the industry, and the shortfall identified in the preparedness of academics to equip students with the necessary attributes. A thorough analysis of the responses available led to a range of actionable recommendations for both students intending to equip themselves better for employability and academic institutions wishing to improve their programs and have more impact on the constantly evolving needs of industry through both this program and the skills graduates can deliver. The paper concludes with the discourse on some recent trends that are shaping and defining the landscape of the IT sector and the programming skills that are indispensable for an aspiring IT professional desiring to make meaningful contributions.

INTRODUCTION

Due to the rapid rate of technical breakthroughs and the growing impact of computing on the global economy, there has been an exponential increase in demand for computing knowledge in recent years (Pirani & Hussain, 2019). In current technologically advanced world, computer programming abilities are more necessary than ever, and programs like India's National Education Policy (NEP) 2020 specifically acknowledge this as a key focus for the advancement and development of these vital abilities. According to Chandra Garisa, CEO of found it, the growing automation of core skills by technology that is moving at a tremendous pace has exponentially increased the barrier for entry-level jobs, and fresh graduates face an uphill battle in getting employment. This has created a critical social issue with the sheer

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number of graduates that are being supplied and the real demand for highly specialized, in-demand skills that has emerged from this mismatch Rai, CNBC(8). This paper directly speaks to that gap by examining specific skills and detailed programming knowledge in depth to show what's actually needed to achieve successful employment in the very competitive IT sector

A thorough survey among the IT professionals working in that area was performed to analyse diverse challenges faced by fresh graduates at their entry-level while trying to join the working sector and specifically to pinpoint some of the necessary core programming topics as well as the crucial skills needed to obtain success. The bottom line of these results is to offer some insightful information that would be beneficial to the academia and faculty members of universities and autonomous colleges, which would equip them to train their students in a better way for the actual requirements and dynamic expectations of the IT industry.

It is said that the difficulty faced by many students in learning programming is the main reason for educational failures and less-than-optimal outcomes. This is the result of an intricate interplay of several factors, including the frustration of the students due to difficult concepts, lack of persistent motivation and interest in the subject matter, relentless pace fast technological changes, which can easily make learned skills obsolete and often rigid and inflexible university curricula unable to keep abreast with changing industry needs. Medeiros et al. (2019) pointed out several challenges of teaching programming-related courses like scalability issues in catering to the different learning needs of students along with maintaining consistent student motivation and engagement throughout one learning process, timely and constructive feedback, effective communication between teachers and students, often a difficult task of selecting the right programming language to teach, and accommodating the inherent limitations of curriculum design and students' varying mathematical backgrounds. These recurring problems reflect issues that have been noted in previous studies, including Soloway et al.'s (1982) pioneering study on the acquisition of programming skills, Mayer's (1981) study on how students learn the BASIC programming language, and many studies that have identified the general "bugs" and mistakes made by programmers (Pea, 1986) ,(Spohrer & Soloway, 1986).

RESEARCH DESIGN

In order to have a better insight into the exact nature of the skill gaps, a comprehensive questionnaire was administered to a carefully selected group of 25 IT professionals who held senior and influential positions in their organizations. The questionnaire was conveniently distributed and collected via Google forms. The questionnaire contained 10 questions that were designed to elicit maximum information from the respondents. These questions targeted several important critical aspects: what are typical recruitment processes that the IT companies have, why there is this reported high failure rate of fresh graduates trying to join the industry,

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whether or not the syllabus of most universities is deemed appropriate and relevant to the practical application in real-life work settings, the usual difference between an academic environment and industry practice, what is the value and objective of the 3-6 months training provided by companies for their new hires, what skills and core competencies are more desirable for an industry employer, and what could be done about the programming education for better students in the workforce.

DATA COLLECTION AND ANALYSIS

The responses gathered from the survey provided valuable and insightful perspectives from seasoned industry professionals. Regarding recruitment, the professionals described a generally multi-stage process that typically involves general aptitude tests, technical assessments (including coding exercises), and HR interviews. They consistently emphasized the critical importance of practical, hands-on skills, well-developed problem-solving abilities, strong logical reasoning capabilities, and excellent communication skills.The high failure rate among graduates seeking IT employment was attributed to a variety of factors, including a distinct lack of practical experience in real-world scenarios, insufficient guidance and mentorship for recent graduates, unclear or poorly defined career paths, and a significant disconnect between the theoretical learning acquired in academic performance and the practical application of that knowledge in real-world industry projects. Many professionals viewed university syllabi as inadequate since they focus so much on mere theoretical knowledge at the expense of practical skills development and current trends in industry. The gap was evident, in that experience learned from working on real-time projects was entirely different from those usually undertaken in academics.

Technological change is now so rapid that it is not easy for the universities to maintain their curricula current and updated. The training period of 3-6 months offered by most companies was considered absolutely indispensable in bridging this gap: It gave fresh recruits hands-on experience, let them get to know company-specific technologies and procedures, and deepened their skills and abilities at solving problems. Basic skills valued consistently included good programming skills in relevant languages, analytical thinking, confidence in one's abilities, effective communication, sound in logical reasoning, and the ability to accurately translate client’s needs and requirements into practical technical solutions.

RESULTS AND DISCUSSION

The survey has brought out a wide gap and highlight concerning the fact that a majority of the computer science graduates obtained the skills in almost association with the industry requirements. This is a case for urging the requirement for practice-oriented education with hands-on learning and a very high demand for a problem-solving mind-set and adaptation skills for rapidly honing changing technology. Drawbacks and obsolescence in current university

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syllabi along with general necessity in post-graduation training programs point directly to a pressing need for a more profound and more effective collaboration between academia and industry in updating relevant courseware and also developing practical skills directly useful in the workplace.

RECOMMENDATIONS

On the basis of the above results, the following recommendations are made:

For Students

Students should involve themselves to the maximum possible extent in activities for the acquisition of practical experience through such means as internships, personal projects, contributions to communities or organizations working on open-source projects, and use of media to search for practical learning opportunities. Good problem-solving skills should be developed with logical reasoning and excellent communication skills, both written and oral. Being involved with emerging technologies and current industry trends is absolutely vital for competition in the job market. Clear career goals along with the development of specific in-demand skill sets would certainly put them among the best.

For University and Colleges

Revisit and revamp the curricula to include more hands-on, life experience learning such as real life projects, case studies and opportunities for collective development. Closer tie-ups and partnerships between universities and the concerned industries would serve in ensuring curriculum relevance, expose students to what is industry expectation and best practice, and give a lifetime opportunity to students with internships and mentorships. Emphasis should move more toward critical thinking abilities, problem solving among students, and improvement in communication abilities. Regular reviews and updates of the syllabi so as to ensure that they are in line with the latest technological advancements and trends that can be observed in the various industries are indeed very essential to maintain the relevance of the education they are providing.

CONCLUSION AND FURTHER RECOMMENDATIONS

This work has clearly shown the large and important gap that needs to be filled with the goal of the industry expressed in computer science education, namely taking the classroom knowledge and applying it with the industry requirements in computer science education. Although universities offer basic information about the fundamental programming concepts, for students, learning activities must be proactively sought and engaged in to provide experiences and develop the very sought after skills in the IT industry. A highly productive collaboration among academia and industry, absolutely, is the key to making university curricula up-to-date, to prepare students for practical problems of the IT industry,

and graduates to be equipped with the skills and the contents for their coming careers. Future work would be able to concentrate upon particular pedagogies and new teaching strategies with a view to further enhancement of programming skill development, investigation of the effectiveness of models of the industry-academic partnership, and longitudinal career follow-up of graduates who have been influenced by practice- and industry-based forms of education.

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