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Present and Future of the Informatics Profession

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What Must a Training in Information Technology Impart?

Hans-Peter Hoidn

After 30 years of working with computers – initially programming on punched cards and now working as a consultant – two main characteristics of a successful IT professional stand out: firstly a knowledge of basic concepts, and secondly practical experience and social skills.

Keywords: IT Professional, Basic Concepts, Practical Experience, Social Skills.

1 Introduction

I recently asked participants at an international conference what today's budding IT professionals should learn. Unsurprisingly, the most common reply was "Java". Thirty years ago, when "computer science" was not yet established as a discipline, I was advised that learning ALGOL and FORTRAN would be a good starting point. At that time (1971, when I was a maths student in my first term), I found these languages extremely interesting, although I had no real idea of their future use. My working years have shown me that mastery of a programming language is no longer enough for an IT professional. Therefore the question regarding the fundamental content of a training in IT cannot be answered simply by quoting the name of the latest programming language.

Another aspect which should be taken into account is the fact that it is very rare for IT projects to be run by trained IT professionals. Computer science has been available as a course at the Swiss Federal Institute of Technology for the last 20 years (and was available a couple of years earlier in Germany), and today there is still a demand for considerably more computer scientists than are being trained by further and higher education establishments (the Swiss Federal Institute of Technology, universities and colleges). And those who were trained in a different subject before embarking on a career in information technology also have to be offered appropriate further education or training.

2 Constant factors in information technology

I have seen quite a few changes during my 30 years in IT. Not all of the skills that were previously required are still relevant today: for example, there is no longer a need to be adept at handling piles of punched cards, something you got the knack of when your own pile got dropped on the floor. But despite these many changes, there are still a few key constant factors. They provide clues as to the universal content of a training which will not become obsolete quite so quickly. So what are these basic constant factors in information technology? I believe they include the knowledge of concepts that are independent of hardware, operating systems and programming languages. Here are some examples to illustrate this.

Even the earliest programming languages included concepts for structuring programs. Then they were called modules and subroutines, now they are called components and methods (even though these terms do not have precisely the same meaning). Then internal processing was structured using locally defined variables, now it is arranged using internally defined objects. It will always be necessary to divide software into individual units that are easy to understand, with well-defined interfaces and internal processing that is not externally visible.

There are certain similarities in the way different programming languages are constructed. FORTRAN uses memory overlay, whereas C obtains similar results with pointers. An IT professional must be able to write programs, and must therefore be able to handle these language constructions, as well as having extensive experience of at least one programming language. Knowledge of a specific language is of less significance: today, Java is important, a few years ago it was Smalltalk, before then it was C and C++, and COBOL is still one of the most commonly used programming languages. It is very useful for project leaders if their programming experience can give them a feel for how long it will take to complete a particular task.

Comparisons can also be drawn in the case of database modelling. Something that is modelled today using UML (Unified Modelling Language) was previously depicted using ER (Entity-Relationship) diagrams (although here again, we are not comparing like with like). The important question here is not whether someone has UML skills, but rather whether they are able to model.

Another clue regarding constant factors can be derived from the fact that old insights from the "COBOL era", such as those described in the well-known book "The Mythical Man Month", are still valid in IT today. These insights apply mainly to working IT professionals and help to demonstrate why IT projects fail time and time again.

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3 IT Professionals

Specialist knowledge is only one aspect of a successful career in IT. I have seen questionnaires which gave the opportunity to categorize one's knowledge of operating systems, programming languages and software products etc in the most diverse ways. However, the boxes ticked on these forms are not of central importance when assessing an employee, even a potential future employee. Since specialist IT knowledge can rapidly become obsolete, it is the ability acquired alongside the specialist knowledge that is more important.

The potential of IT professionals is most evident during job interviews. In such a situation, great importance is attached to their social skills, in particular their ability as team players, as well as their technical skills. These social skills are seldom covered in depth during education and training courses. Although such training does involve group work, and social skills are assessed under the heading "Project Leading and Project Management", I believe that these aspects are given

short shrift in IT training. I could well imagine "industrial psychology" becoming an integral part of IT training courses.

4 Conclusion

IT training must on the one hand convey the basic concepts, and on the other hand reinforce skills by providing the opportunity to learn an appropriate trade. A training that consists entirely of theory is as unsatisfactory as one that is oriented simply towards Java. Theoretical training does not impart experience, and a training that is primarily practical in content does not adequately promote the understanding of concepts. Here, as is often the case, it is not easy to find a balance.

A training in IT must impart social skills. It is often shortcomings in this area, rather than technical inadequacies, that are responsible for the failure of projects; this situation can be improved.

English Translation: Pat Moody