The use of nonprocedural (fourth generation) languages created a revolution in the manner in which computer-based information systems are being constructed. These languages are being used extensively by end-users and by programmers in end-user departments. They are being also used, to a less extent, by traditional programmers whose major computing environment is the mainframe. Programmers’ performance is a function of two major groups of variables: those that are related to the person (his/her attributes) and those related to the environment. This paper reports the results of a study that compared the attributes of programmers in a large centralized third generation mainframe environment to the attributes of fourth generation programmers in the same company. Significant differences were detected. Based on this finding, this paper suggests a procedure for matching an individual’s attributes with the characteristics of different software environments.

The purpose of computer languages is to enhance communication between people and computers. The complexity of the programming task is determined, in part, by the gap between the languages of the computer and the language of the person (Klerer, 1987). Computer languages are evolving in order to reduce this gap.

The third generation languages (3GLs), also known as high level languages, emerged in the late 1950’s. These languages are designed for use by a trained information systems professional, who develops well-defined applications in a structured environment. Third generation languages require a large number of lines of detailed code with sequential, procedural logic (Martin, 1985).

The fourth generation languages (4GLs) are nonprocedural since they specify what is to be accomplished, but not how it is to be done. Thus, the 4GL programs are less detailed and shorter (Williamson and Maginnis, 1990). Enhancements and maintenance are easily performed (Case and Manley, 1986; Matos and Jalics, 1989), allowing for rapid development and customization (Miller, 1990). However, the 4GLs lack standardization (Lehman and Wetherbe, 1989) and require more machine running time and over-
head (Matos and Jalics, 1989). The types of skills needed for proficient programming with the 3GLs and the 4GLs differ. The 3GLs require more programming skills while 4GLs, which are used by end-users, require less programming skills.

A recent survey identified the most important traits for programming jobs in general (Licker and Miller, 1989): 1) ability to solve logical problems, 2) ability to work with precision and details, 3) team work, 4) empathy, 5) understanding the business environment, 6) working with others, and 7) concentration. The importance of these traits may vary from one language environment to another. Precision, details and concentration seem to be important attributes for the 3GL environment, while team work and working with others are the perceived traits associated with the 4GL environment. Thus, it seemed likely that the types of programmers attracted to the 4GL environment would be different than the programmers attracted to the 3GL environment.

The first purpose of this study is to investigate whether the educational background is the same for programmers working in different environments (i.e., 3GL and 4GL). The second purpose is to investigate whether certain personality modalities are the same for programmers working in different environments. Finally, with the trend of increased use of the 4GL tools in the mainframe environment and with the increased trend for distributed systems, many MIS managers must hire both 3GL and 4GL programmers. Thus, the third purpose of the study is to determine if there is enough evidence which will allow employers to best match programmers with jobs in 3GL and 4GL environments.

The above objectives are attained via a survey conducted in a large utility company. The description of the survey, its methodology, results and analysis are reported in the following sections.

Hypotheses

As discussed, this study has three objectives.
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