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A comparison between paper and pencil and computer based assessment

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In this study, we describe two tools designed for comparing paper and computer assessment modalities: a “comparison table” to control migratory process from paper to computer modality and vice versa and a “grid for observation of students” to codify students’ behaviours in solving process.

Keywords: Paper and pencil based assessment, computer based assessment, comparability, students’ behaviours comparison.

INTRODUCTION

A large number of Institutions for Assessment (OECD-PISA, PIAAC, NAEP, ...) introduced a computer-based section. Ripley (2009) analyses the main approaches to the use of technology to support assessment. In particular, he defines the *migratory approach* to indicate paper based tests migrating to screen based environment. Research on migrated tests, involving comparative analysis on outcomes, finds no statistical evidence to suggest that the administration modality changes the coherence and consistency of the test (Kim & Huynh, 2007).

Quantitative studies give information on students’ performances in scoring without dealing with cognitive aspects affected by this changing of environment. Threlfall and colleagues (2007) explore the effect on assessment of paper and pencil test items migrating into their computer corresponding ones. They show that, even if in most cases changing to the different environment seems to make little difference, for some items computer deeply affects how the question is attempted and what is being assessed. Furthermore, researches start from the assumption that it is possible to consider these assessment modalities as equivalent.

The aims of this study is to develop a scheme to control, in terms of equivalence, migrating processes from paper to computer and vice versa and to analyse cognitive aspects influenced by these migrated tests.

FRAMEWORK AND METHODOLOGY

Comparing students involved in tests in different environments requires considering comparable questions. In migration process corresponding features of the questions probably change, such as syntax, vocabulary, editing, layout, and others. For this reason, it is necessary to define a monitoring tool in order to control any possible changes that might affect the comparability of questions. We define a *comparison table* to control the migration from paper to computer based question and vice versa.

We administer to couples of students two parallel tests of migrating items, one in computer and the other in paper environment. Every couple involves in only one of these tests; protocols are video taped with the purpose to focus on behaviours and heuristics processes.

Protocol analysis is performed through a *grid for observation of students’ behavior*, inspired by the definition of problem solving episodes proposed by Schoenfeld (1985), which allows to identify differences focussing on strategies, planning and results, in qualitative terms.

CONCLUSION

Qualitative analysis on migrated questions shows that migration from one administration modality to another is necessarily influenced by the environment in which these questions migrate. It reveals the inconsistency in the definition of equivalence between questions in computer and paper environment.

In general, protocols analysis highlights that students achieve the same outcomes in both administration modalities. However, a deeper study on cognitive processes shows case studies in which administration environment greatly influences students' strategic choices in resolution process. In other cases, despite comparable heuristic choices, the organization of the problem-solving process is less linear in computer than paper modality.

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