

Perception of Students and Staff Toward Script Concordance Test as A New Assessment Tool for Measuring Clinical Reasoning in A Problem Based Learning Medical School in Egypt

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Abstract

Background: Problem Based Learning (PBL) is an educational strategy that helps students to integrate new information in a rich and connected knowledge network, thus promoting clinical reasoning skills. The Script Concordance Test (SCT) is a new assessment tool that assesses clinical judgment objectively in medical students. It is based upon an adaptation of the cognitive psychology script theory. **Aim:** This study aimed to explore the students' and subject matter experts' perception towards SCT as a tool to assess clinical reasoning during the clinical clerkship years at the faculty of medicine, Suez Canal University. **Subjects and Methods:** A Script Concordance Test (SCT) was developed in pediatrics. It comprises 10 clinical vignettes and 30 test items to assess aspects such as clinical diagnosis, investigation and treatment, as well as biomedical ethics. It was validated and given to 170 sixth year students and a panel of experts comprising 10 pediatricians. A self-administered questionnaire was distributed to the participants of the study to assess their perception about SCT as a new assessment tool for clinical reasoning. **Results:** The results of the study showed a statistically significant difference ($p < 0.001$) between the mean of the students' total test score (46.24 ± 10.39) and the mean of the experts' total test score (78.05 ± 11.38). Furthermore, 77.1% of the students and all experts agreed that the SCT could help in preparing students for their future practice. **Conclusion:** Students and faculty perceived SCT to be suitable for use during the clinical clerkship years and for postgraduate studies.

Keywords: Script concordance test, Clinical reasoning, Script theory, Problem Based Learning

Introduction

The Problem Based Learning (PBL) curriculum is a case-based, student-centered learning model. In this educational strategy, students identify their shortcomings and queries, and find a way to investigate and solve them. Students can use different research tools as textbooks, journals, case-reports, and online information resources. PBL not only motivates students to retain

interest in knowledge and reinforce the satisfaction of learning, but also facilitates the long-term registration and relevant recall of information when they are faced with similar real-time patients⁽¹⁾. The purpose of PBL curriculum is to give meaning to the art of clinical reasoning⁽²⁾. Clinical reasoning usually occurs in a developmental continuum from novice to expert⁽³⁾. Clinical problem solving skills differ according to the level of experience. Experts (practic-

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ing physicians) are expected to have better organized knowledge structure and greater deal of practice than novices (students). Practice determines the number and connections of 'illness scripts' (in memory) which determine the ability of problem solving⁽⁴⁾. Most current methods of professional competence assessment, either performance-based methods, such as Objective Structured Clinical Exams (OSCE) or methods assessing the solutions found to well-defined problems, such as Multiple Choice Questions (MCQs), are measures of behavior. Since assessment of the process, represented in clinical reasoning, is as important as assessment of outcomes, represented in the behavior, the necessity for new assessment tools for assessing the process arose. The Script Concordance Test (SCT) is a promising theory-based assessment tool that assesses clinical reasoning objectively⁽⁵⁾. The script theory is based on giving a meaning to and act adequately in a situation that activates scripts relevant to this situation. This theory postulates that in specific situations clinicians mobilize pre-stored sets of knowledge (their scripts) that are used to understand the situation and act according to specific goals (e.g., diagnosis, investigation, or treatment)⁽⁶⁾. Scripts of experienced clinicians vary on details, because each clinician has his or her own clinical experience, but they are similar for the essential elements. According to this theory, reasoning is based on judgments that can be compared to an experienced panel and this could provide a method for assessing reasoning on ill-defined problems and in context of uncertainty. This approach is called script concordance approach⁽⁷⁾. The script concordance test is case-based. Cases, described as short scenarios, always incorporate uncertainty. Several options are relevant to solve the diagnostic or management problem posed by the situation. A case, with its re-

lated questions, constitutes an item⁽⁸⁾. The format is patterned after a standard model of the clinical reasoning process, the hypothetico-deductive (HD) model. The HD model proposes that very early on during a clinical encounter, clinicians generate a few hypotheses based on patients' initial verbal and nonverbal cues, and then collect data (i.e., relevant history, physical exam, laboratory results and other investigations, etc.) to confirm or reject these hypotheses⁽⁹⁾. Studies on the SCT were undertaken to verify the discriminant validity of the test^(10,11). Results showed an increase in the mean scores of individuals with differing levels of clinical expertise (students, residents, and staff members); the less experienced getting the lower results. This supports the construct validity of the instrument⁽⁵⁾.

Subjects and Methods

Study design

A descriptive cross sectional study was conducted at the Faculty of Medicine, Suez Canal University, Egypt; a PBL medical school, where an assessment tool for clinical reasoning (SCT) in pediatrics was developed and administered to sixth year students and a panel of pediatricians. The perceptions of the students and staff members towards the developed SCT were assessed.

Participants

All sixth year students were recruited in the study (n=170) in addition to 10 pediatricians representing the panel of experts.

Data collection

A pediatrics version of the SCT was developed based on the educational objectives of the 6th year curriculum in the faculty of medicine, Suez Canal University. A table of specifications (blueprint) based on these objectives was developed, thus ensuring that the test covers adequate content of

the course. The relevance, appropriateness, and quality of the items developed for the diagnostic, investigative and treatment knowledge sections of the SCT was completed through written and verbal consultations with pediatricians and medical educationists. A panel of experienced pediatric physicians, chosen among a list of certified general and specialist pediatricians with an expressed interest in medical education reviewed the SC test for both face and content validity by using an evaluation form adapted from the evaluation form to validate the SCT⁽¹²⁾. The resulting 20 item SCT was constructed to measure students' abilities to diagnose common pediatric presentations, to identify appropriate laboratory tests for confirmation of diagnoses, and to choose appropriate treatment or management options. All 6th year students took the test, as well as 10 pediatricians representing the experts for comparison of test results. Students' perception was assessed through an anonymous questionnaire comprising 18 questions administered at the end of the exam. Experts' perception was also assessed using the same 18 items questionnaire. The questionnaire included questions about the clarity of the test items, whether they prefer it to be used as an assessment of instructional tool, which level they prefer it to be introduced, the content coverage, and whether the test was motivating.

Test administration

Students were informed early during the academic year that SCT will be introduced during final exams. The students were given examples of SCT questions and strategies on answering these questions in a training session. The students were also informed that the scores of the SCT will not account in any way in their grades. The SCT was administered to the entire 6th year student batch after the end of the official

exam with the same setting. Each student was requested to answer the test items individually. The test's duration was 30 minutes for 10 vignettes and 30 questions.

Key score

The key score was based on an aggregate method that takes into account the variability of responses of experienced clinicians to particular clinical situations. To compare a range of potential responses to the pediatrics version of the SCT, we identified two functionally different groups of participants with a range of clinical experience in pediatrics (i.e., medical students with no or limited clinical experience, and the panel of experienced pediatricians). One of the main protocols of the SCT was to use the responses obtained by a group of experienced clinicians as the standard for the scoring key and, hence, from which other examinees' (i.e., medical students) clinical knowledge was assessed.

Results

The reliability analysis for the pediatrics version of the 30 question SCT derived a Cronbach's alpha value of 0.55 of fair internal consistency. The analysis of the experts' and students' test score showed a statically significant difference ($p < 0.001$) between the mean of the students' total test score (46.24 ± 10.39) and the mean of the experts' total test score (78.05 ± 11.38). The results of this study showed that 64.7% of students and all experts agreed on the clarity of the directions for exam, and that 44.1% of students and 80% of experts thought the overall test format was clear. One of the important advantages of SCT is the high content validity it can provide, as it could assess a wide range of educational objectives in a short time. In this regards, 50% of the students found the SCT items covering 75% or more of the objectives. De

spite that all the test items were included in the course specification, the majority of the students (70.6%) and all the experts found the SCT difficult to answer. More than 90% (90.6%) of the students and all

experts preferred the introduction of SCT in the clinical clerkship phase and post-graduate education. The opinions of the students and experts.

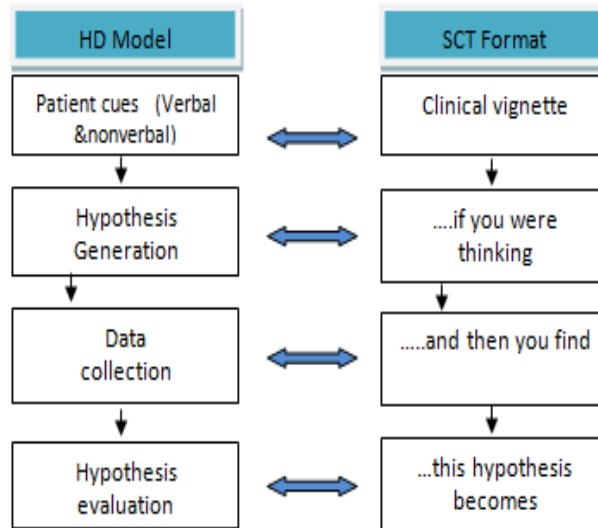


Figure 1: Relation between hypothetico-deductive model and script concordance test format⁽²⁰⁾

The opinions of the students and experts varied concerning many items, as most of the students (81.2%) preferred the SCT as an instructional method, while 60% of the experts preferred it as an assessment method. Also 58.8% of students preferred the SCT introduction during rounds exams, while 60% of experts preferred its introduc-

tion in the final exams. Despite that the SCT was motivating for 59.4% of the students and all the experts in the current study, most students did not prefer it to replace any other assessment methods, except for the triple jump exam (problem solving exam), where 70.6% of students agreed it can be replaced by SCT.

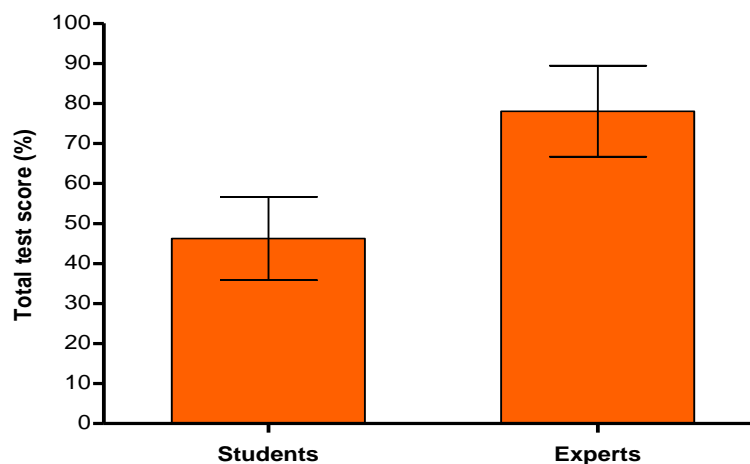


Figure 2: Scores of the script concordance test (%) for students and experts. Data are presented as mean \pm SD at confidence level 95%.

The experts' agreed with the students' regarding the replacement of the SCT by other assessment tools. The results of the current study also showed that 77.1% the students and all the experts felt that the SCT could help prepare students for their future practice.

Discussion

The main purpose of this study was to explore the perception of clinical clerkship students and staff at the Faculty of Medicine Suez Canal University towards a relatively new tool for assessing clinical reasoning; the script concordance test. A SCT in pediatrics was developed and validated, then administered to 170 grade 6 students, in addition to a panel of 10 pediatricians, as

the rules of the SCT require. The Faculty of Medicine, Suez Canal University is the first PBL School in Egypt. It has been adopting PBL as its main educational strategy since 1978⁽¹³⁾. Since then, it has been assessing clinical reasoning in written exams which are mainly Patient Management Problems (PMPs), in clinical exams (long case and short case exams), and also separately through the triple jump exam, also called the problem solving exam. The triple jump exam has been restricted to the pre-clinical years and the faculty relied in the clinical years on implicitly assessing clinical reasoning through the written and clinical exams. It is well known that assessment methods such as PMPs and triple jump exams have content validity problems as well as reliability problems⁽¹⁴⁾.

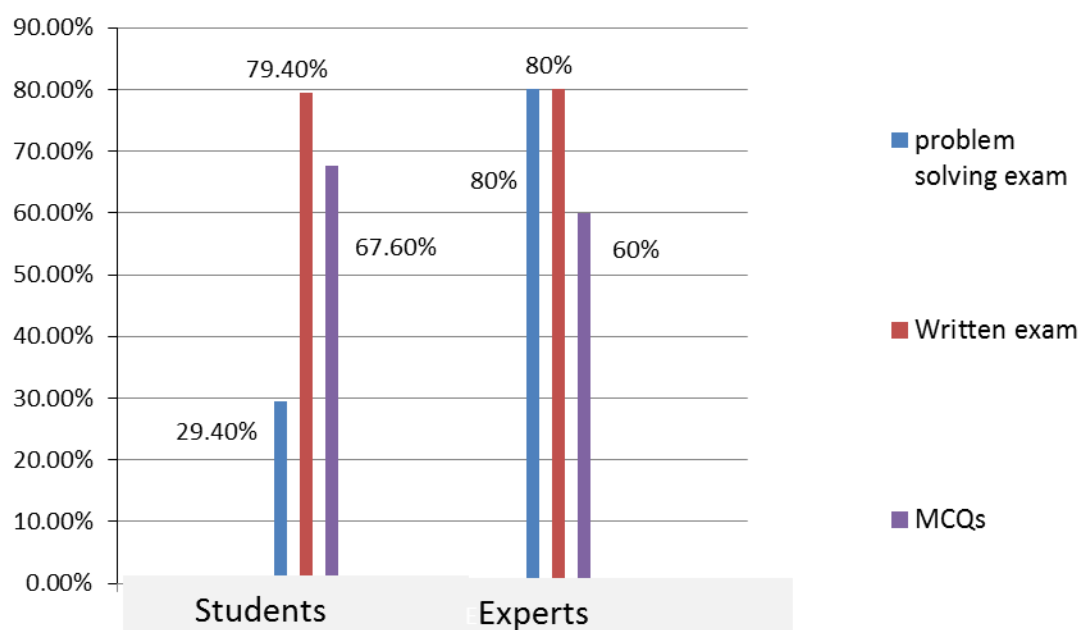


Figure 3: Students' and experts' opinions about replacement of different types of assessment by SCT

The need for a new tool that assesses clinical reasoning as a separate competence and that brings valid and reliable results was obvious in the recent years, as problem solving and diagnostic reasoning have been emphasized as the essentials of the art of practicing medicine⁽²⁾. The students'

and the experts' scores on the SCT showed statistically significant differences, where the medical students had significantly lower mean scores compared to the reference panel physicians. These findings are consistent with the literature⁽⁵⁾ since one of the main purposes of SCT is to discriminate

between experts and novice, and the scoring system of the test is designed to measure the distance, that exists between examinees' scripts and scripts of the panel of experts⁽⁶⁾. These findings support the construct validity of the SCT as an assessment tool for clinical reasoning in a problem-based medical school. The developed SCT showed fair reliability. We administrated only half the number of the developed questions because the time allowed by the faculty administration was limited as they thought students might be discouraged to spend an hour answering an exam they know its scores will not account in their final grades. Our emphasis in this study was not the test scores as much as the perception about the test and the acceptability from the part of students and staff. The majority of the study participants agreed on the clarity of the directions for exam and agreed that the developed test included common health problems. However, the opinions of the students and experts' panel differed on the clarity of the test format, where most of the students found them unclear, while the experts found them totally clear. Some of the students needed guidance in taking the test, and some others said the language was difficult for them. This indicates that the test was challenging for them, a finding that is in line with the literature, which describes that the challenge in SCT comes from the vignette that does not contain all the data needed to provide a solution, or because several attitudes are defensible⁽⁵⁾. Perhaps this is also the reason why most of the students did not prefer SCT to replace some type of assessment methods such as MCQs and written exams because it was more difficult to answer. Nearly half the study participants said the test covered more than 75% of the course objectives, while very few students said it covered less than 25% of course objectives. The literature

emphasized on the importance that the content of the exam reflects the objectives of the curriculum⁽¹⁵⁾. Content validity was essential for us during the development of the test since it is one of the main reasons why we choose to introduce SCT to the assessment tools in the faculty. For this reason, a blueprint was developed and the test was further tested for content validity by pediatricians and medical education experts. The majority of the participants in our study found the developed test too difficult. This could be because they are not well trained or familiar with this type of assessment tools. The findings of this study concerning the appropriate phase for the use of the SCT are consistent with many studies that used the SCT in assessment of various specialties in the residency and medical clerkship^(16,17). In concordance with the literature⁽⁷⁾ which suggests that, SCT can be used in different assessment purposes as summative, formative and even for self-assessment; in our study the experts' opinions preferred the SCT as an assessment tool, while the students recommended it as an instructional tool. Consistent with previous research⁽¹⁸⁾, the majority of the students and all the experts were motivated by the SCT but they were curious about the objectivity of the scoring system.

The aggregation method of the SCT provide a useful comparison with the performance of the experts which helps in the enhancement of the students learning through feedback⁽¹⁹⁾ and the SCT results are close to reality as the interpretation of the clinicians usually differ in uncertain clinical situations⁽²⁰⁾. The participants in the current study agreed that SCT could help in the development of clinical reasoning skills that will prepare for future practice, which is consistent with many studies⁽²¹⁻²³⁾ that concluded that; knowledge organization in clinical situation as in SCT could predict the

future practice or be used in the monitoring of the clinical reasoning progress.

Conclusion

The study concluded that the developed pediatric SCT was a practical and reliable assessment tool for assessing clinical reasoning among sixth year medical students. The test scores for students and experts and the range of students' scores that fell within the experts' scores seemed to conform to the norms of the SCT scores applied in other studies. Our findings support its construct validity for assessing medical students' clinical reasoning in the face of uncertainty. Medical students found the SCT motivating and felt it prepared them well for real practice, and thought it was suitable for assessing biomedical ethics, however, they did not recommend its introduction in the assessment methods at the faculty. The test was unfamiliar to both students and experts and they worried about its model answer.

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