

Virtual Humans and Formative Assessment to Train Diagnostic Skills in Bulimia Nervosa

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Abstract. Carrying out a diagnostic interview requires skills that need to be taught in a controlled environment. Virtual Reality (VR) environments are increasingly used in the training of professionals, as they offer the most realistic alternative while not requiring students to face situations for which they are yet unprepared. The results of the training of diagnostic skills can also be generalized to any other situation in which effective communication skills play a major role. Our aim with this study has been to develop a procedure of formative assessment in order to increment the effectiveness of virtual learning simulation systems and then to assess their efficacy.

Keywords. Virtual humans, formative assessment, medical education, psychological education, bulimia nervosa, psychopathological exploration

Introduction

The training in psychopathological exploration through graphic simulation methods has several advantages compared to traditional procedures:

- Cost is lower as there is no need to carry out the necessary “logistics” involved in training with real patients.
- Allows training with patients who have unusual pathologies.
- Provides higher control of the various situational parameters and so it is possible to isolate or highlight environmental dimensions that are significant to the student’s learning process.
- Facilitates auto-training and overlearning, given that the student does not have to wait for the situations to occur in real life but can produce and reproduce them when desired.
- Allows a more customized design of the different learning hierarchies so that the student can be exposed to as many situations as possible.
- It’s a secure environment and the tutor or student can at all times control what is happening.
- It’s an activity that is mainly directed by the student. There are well-known theories highlighting that self-directed activities are best for learning and thus for behavioural modification too.

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1. Methods

A virtual environment was developed in which the learner could conduct a clinical interview with different Virtual Patients (VPs). Each of these VPs showed a specific mental disorder that corresponded to bulimia nervosa or to other disorders that may mimic bulimia. In this simulation, skills of differential diagnosis are taught via a series of diagnostic interviews conducted with these VPs. The objective of the interviews is to obtain enough data to formulate a diagnosis. To do so, the user selects the most suitable question at each stage of the interview; the system informs him/her how accurate his/her choice is, and the VP responds to his/her questions. The user decides at each stage whether to continue asking questions or whether s/he has enough information to formulate a diagnostic hypothesis. If s/he selects the correct diagnosis at any given time during the interview, the system will only accept it if the VP has been fully examined.



Figure 1. Virtual patient selection

The performance in a final test of a group of students who received formative assessment and a group who did not was compared. A total of 42 students were included in the study. They were following core or optional courses as part of their bachelor's degree in Psychology (University of Barcelona) and in which skills in psychopathological explorations are part of the course.

The participants were randomly assigned to two groups: formative assessment group (21 students) and another group (control) without formative assessment (21 students). The experiences of the group that received formative assessment were explored in two interviews that took place at the end of the first month and two weeks before the end of

their course. The purpose of these interviews was to review the students' degree of understanding of the assessment criteria of the simulated explorations and to what extent they believed they had achieved a positive performance based on these criteria. In the second interview students were reminded of their previous answers and were asked to comment on them. The results of the exercises on psychopathological exploration were used in the interviews to discuss with the students the concrete examples of their work.

The questions used in the interviews of formative assessment were based on Sadler's model on formative assessment [1], which was later elaborated by Nicol & Macfarlane-Dick [2]. During these interviews, conversations held with the students were aimed to analyze their perception on the purpose and characteristics of a correct psychopathological exploration and the results they had attained so far in the exercises with the VPs. The conversations were stirred to try and guide the analysis towards the student's self-assessment on their performance and how they could improve the quality of their work in future exercises. In the second interview we sought in particular to focus the student's attention on their progress since their first interview. During both interviews our aim was that the students should acquire awareness of their degree of understanding and internalizing the criteria that allow to assess the quality of a psychopathological exploration.

Table 1. Interviews of formative assessment

Areas of analysis	Questions
Which is the strategy applied?	<p>Explain how you have prepared the exercises in psychopathological exploration that you have done until now (contents and other course materials consulted, questions asked to tutors, exchange of knowledge and information with other students, contents and materials related to the course but obtained from other sources-other subjects, internet databases etc.)</p> <p>What are the similarities and differences in the procedure you have followed to prepare the exercises for a psychopathological exploration compared to other students.</p>
According to the student, what are the requirements for a correct psychopathological exploration?	<p>In general, what should a correct psychopathological exploration be like?</p> <p>Can you give concrete but fictitious examples of a correctly carried out intervention during a psychopathological exploration?</p> <p>Can you give concrete but real examples taken from your own exercises of a correct intervention during a psychopathological exploration?</p> <p>Can you give concrete but fictitious examples of incorrect interventions during a psychopathological exploration?</p> <p>Can you give concrete but real examples taken from your own exercises of incorrect interventions during a psychopathological exploration?</p> <p>On what sources of information or experiences do you base your criteria concerning the correctness or incorrectness of the interventions that take place during the course of a psychopathological exploration?</p>

<p>How does the student interpret the feedback given by the tutor on the results of their exercises in psychopathological exploration?</p>	<p>What do you think the tutor is looking for with the way the exercises on psychopathological exploration assigned to you are laid out and you have completed so far?</p> <p>What is your opinion about the evaluative comments made by the tutor on exercises in the psychopathological exploration you have completed so far?</p> <p>How do you think you can improve your abilities in psychopathological exploration during the next exercises from the comments received by the tutor on the work you have done so far?</p> <p>(Second interview) In what aspects do you reckon that your abilities in psychopathological exploration have improved since the last interview until now taking into account the comments made by your tutor on your progress?</p>
<p>How does the student evaluate his own learning of abilities for a psychopathological exploration?</p>	<p>Independently from the reviews you have received from the tutors, how do you value your level of learning attained so far?</p> <p>On what do you base this evaluation of your learning process?</p> <p>What are the similarities and differences between the learning you have attained compared to other students?</p>
<p>How will the students' personal evaluation of his performance so far, influence future strategies for learning?</p>	<p>From your experience with the exercises in psychopathological exploration and the results obtained so far, what aspects of the preparation and implementation of future exercises would you modify?</p>

2. Results

To verify the efficacy of the formative assessment procedure, the final exam scores on the abilities for a psychopathological exploration were compared between the groups that carried out the exercises of training abilities in the exploration with formative assessment with the group that carried out the exercises without formative assessment (table 2).

Table 2. Scores on the test of abilities for a psychopathological exploration of bulimia nervosa

Group	N	Mean	Standard deviation
Formative assessment	21	9,16	,57
Control	21	8,21	1,01

As observed below, the group that received formative assessment achieved better scores in the final test of abilities for a psychopathological exploration of bulimia nervosa. The difference in means was statistically significant ($t= 3,76; p<0.01$).

With the purpose of assessing the satisfaction of the students with the formative assessment procedure, the scores observed on the Likert scale (10 points) used to measure this variable in both groups were compared (table 3).

Table 3. Satisfaction with the tutorials

Group	N	Mean	Standard deviation
Formative assessment	21	8,81	,68
Control	21	7,66	1,19

Conclusions

The results obtained indicate that the training of skills in the exploration of psychopathological disorders such as bulimia nervosa can increase its effectiveness by including explicit discussions about the learning process. This therefore allows both students and professors to modify specific learning strategies based on these conversations and according to the procedures of formative assessment.

The cost of implementing these strategies is higher compared to carrying out activities that do not involve formative assessment. It would be interesting to analyze in future studies, not only the efficacy of such procedures, which seems to have been demonstrated, but also the efficiency. The aim could be to evaluate if the increase in cost of its implementation during teaching hours is compensated by the improvement in the learning process of the students.

Along these lines, the possibility of computerization of these procedures could be a very interesting alternative. If we can manage to incorporate some type of modules through which the system can automatically provide the student and the tutor the necessary information within the programs of virtual simulation of psychopathological explorations, allowing them to carry out formative assessment, the elevated cost of implementing such a procedure of evaluation compared to more traditional methods can cease being an obstacle.

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