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Health Assessment Tool for Undergraduate Nursing Students and Novice Instructors; Validity, Reliability and User Satisfaction

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Abstract
BACKGROUND: Available tools for health assessment course lack guidance to novice instructors, detailed performance checklists, and domain-specific information that takes into consideration the limited health experience and tight schedule of undergraduate nursing students. The researcher developed a health assessment tool, including student's manual and instructor's guide to help both students and novice instructors. **OBJECTIVES:** To assess the validity and reliability of the newly developed tool and to measure tool-related satisfaction among recently graduated nursing students and novice instructors. **METHODS:** A cross-sectional design was utilized in 2014. Face and content validity were assessed by experts (N=21). The reliability was examined by comparing the students' marks (N=63) for health assessment skills, as assessed by two different experienced raters. The satisfactions of both students and novice instructors (N=7) were measured using two-different questionnaires that covered different aspects of the relevant manual. **RESULTS:** Experts had 90.8% positive score for face and content validity for the tool including laboratory evaluation. The tool was highly reliable in assessing of students' skills during laboratory evaluation, with intraclass correlation of 0.99. Both students and novice instructors had high satisfaction level with their respective version of the tool (83% versus 91%, respectively). **CONCLUSIONS:** The developed tool for health assessment course is highly valid, reliable, and satisfying both student and instructor expectations. Future studies are required to examine the effectiveness of the newly developed tool in improving the health assessment skills of the students and to assess how much of these skills are actually retained and practiced after clinical placement.
Keywords: Health Assessment, manual, undergraduate education, Nursing, Validity, Saudi Arabia

1. Introduction

Economic growth over the last few decades in Saudi Arabia have resulted in major socioeconomic changes, including expanded healthcare services to increasing numbers of Saudi patients [1]. Shortage of Saudi healthcare professionals, specially qualified nurses, has been recognized as one of the critical challenges faced by the healthcare system in Saudi Arabia [1, 2]. According to recent data (2015) from the Saudi Ministry of Health, only 38% of 172 thousands nurses currently working in Saudi Arabia are actually Saudi, with even much lower percentage in the private sector (5%) compared to the governmental sector (55%) [3]. Several strategies have been suggested to correct this huge imbalance between national and expatriate nursing working force, including expanding education programs, improving working environment, and improving public image [4]. Therefore, over the last decade, 18 new universities in addition to the 7 existing universities are now offering some sort of free nursing education [4].

Health assessment skills that once recognized as an absolute physician role has been identified as one part of the nurse practitioner role in several Western countries during the second half of the 20th century [5]. Health assessment course for undergraduate nursing students is critical in developing the knowledge and skills required by future nurses to perform holistic, comprehensive assessment of their patients [6]. Teaching health assessment course to undergraduate nursing students represents a big challenge due to their generally very limited experience in health professions [7]. Additionally, this limited health experience highlights the critical importance of well-developed course tool that satisfies both students and instructors [8]. Moreover, the course tool needs to consider the integration of cultural competence skills to improve the relevance of the clinical experience gained by the students [9]. Therefore, efficient and reliable health assessment module that integrates both theory and practice is critically needed to adequately prepare nursing students for their future carrier [10].

The College of Nursing (CON) at the King Saud Bin Abdelaziz University for health science (KSAU-HS) in Riyadh, Saudi Arabia is offering a Bachelor of Science degree in Nursing (BSN). Although comprehensive, the available tools for the health assessment course lack detailed performance checklists and evaluation instruments with written criteria. Additionally, they don't provide domain-specific information that takes into consideration the tight student schedule. Finally, there is a need for an efficient tool to guide novice instructors who are willing to teach health assessment course but have limited or no experience in teaching such a specific course. As the CON of the KSAU-HS has a progressively increased admission rate of undergraduate nursing students and limited number of trained instructors, the researcher developed a tool for the health assessment course to standardize the educational and evaluation process, to build student assessment skills, to fairly and reliably assess nursing students, to facilitate the work of the novice instructors, and finally to ensure

satisfaction of both nursing students and novice instructors. The tool included health assessment manual for students and health assessment guide for novice instructors. The objective of the current study was to assess the validity and reliability of the developed tool for the health assessment course (including the student's manual with performance checklists and the instructor's guide) and to measure tool-related satisfaction among recently graduated nursing students and novice instructors.

2. Methods

Setting: The current study was conducted at CON of the KSAU-HS in Riyadh, Saudi Arabia. KSAU-HS was established in 2005 as the first public University in Saudi Arabia specialized in health sciences, with a main campus in Riyadh and another two campuses in Jeddah and Alhassa. The CON is one of the seven colleges of KSAU-HS and was established in response to the massive shortage of Saudi nurses, amounting to 100,000 positions at that time. The BSN program offered by the CON consists of 136 credits (including 88 academic credits and 48 laboratory credits), distributed in 43 courses taken in 8 levels (semesters) or four years. A total 165 undergraduate students are currently enrolled in CON in Riyadh, with an average 71 students are graduated every year. CON in Riyadh is served by a total 15 full-time professors and 35 academic/teaching staff.

Study design: A cross-sectional research design was utilized in this study between February and March 2014. The study obtained all required ethical approvals from the institutional review board at KSAU-HS.

Population: The study examined three groups; experts, novice instructors, and students. Experts and novice instructors were faculty working in CON of KSAU-HS (Riyadh) while students were undergraduate students enrolled in BSN program of CON of KSAU-HS (Riyadh) during the time of the study. The face and content validity of the tool of the health assessment course were evaluated by 21 experts in the field of curriculum development and teaching health assessment course (theory and/or practice). Instructor satisfaction was evaluated by 7 novice instructors who have recently taught the health assessment course for the first time (theory and/or practice) by using the newly developed instructor's guide. Student satisfaction was evaluated by all the (63) students who have just finished the health assessment course conducted using the newly developed student's manual in the fall semester of the academic year 2013-2014.

Health Assessment course: It is a 4-credit course (2 academic credits and 2 practical credits) given to undergraduate students enrolled in level 5 of the BSN program. It provides the student with the opportunity to develop skills in physical assessment to be able to evaluate the patient's health status from a holistic perspective. The course is given concomitantly with the adult nursing care course and after finishing pre-nursing anatomy and physiology courses. The applications of selected principles from previous sciences and nursing courses are incorporated throughout the theory content of the course. Laboratory science experience (nursing skills laboratory) is provided to develop skills necessary to perform comprehensive health assessment to a diverse population.

Evaluated tool: The tool has two parts; health assessment student's manual and instructor's guide. The student's manual for health assessment course is a student handbook covering the followings sections; (1) steps for assessing body systems, including normal findings, (2) performance checklists, (3) student's assessment instruments, and (4) Students' activities including assignments, case scenarios and documentations. Instructor's guide for health assessment course is a faculty handbook covering the followings sections; (1) detailed instructor's assessment instruments, (2) implementation procedure for the course including plan for each laboratory session, and (3) detailed evaluation process including the procedure steps for assessing student skills during laboratory quizzes.

Data collection: Experts were asked to evaluate the face and content validity of the tool of health assessment course using a detailed expert questionnaire that covered the implemented techniques in the examination of body systems, the performance checklists, the two versions of evaluation sheets (instructor's and student's), and student activities, in addition to their opinion regarding the implemented techniques (sequence of laboratory session) and the process of laboratory evaluation. The expert questionnaire included 61 questions answered in a five-point Likert scale; strongly agree, agree, neutral, disagree, and strongly disagree. Additionally, the reliability of the tool of health assessment course was examined by comparing the students' marks for health assessment skills during laboratory evaluation, as assessed by two different experienced raters. The health assessment skills evaluated included the examination of the following systems; respiratory system, cardio-peripheral system, abdomen, head and neck, neuromuscular, and overall head-to-toe examination. The marks allocated for each system was 20 marks with a total of 120 marks.

The satisfactions of both novice instructors and students towards tool of health assessment course were assessed using two-different detailed questionnaires that covered the relevant tool content, performance checklist, evaluation instruments, students activities, implemented teaching technique, and the process of the laboratory evaluation. The novice instructor's satisfaction questionnaire included 66 questions answered in a five-point Likert scale; strongly satisfied, satisfied, neutral, dissatisfied, and strongly dissatisfied. Similarly, the student's satisfaction questionnaire included 19 questions answered in a five-point Likert scale; strongly satisfied, satisfied,

neutral, dissatisfied, and strongly dissatisfied.

Statistical Analysis: Data were presented as frequencies and percentages for categorical data and mean and standard deviation (SD) for continuous data. Responses to individual questions of the expert questionnaire were given 5 points when strongly agree, 4 when agree, 3 when neutral, 2 when disagree, and 1 when strongly disagree. Expert score was calculated by summing up the scores of the 61 questions. Responses to individual questions of the questionnaires of both novice instructors and students were given 5 points when strongly satisfied, 4 when satisfied, 3 when neutral, 2 when dissatisfied, and 1 when strongly dissatisfied. Novice instructor's satisfaction score was calculated by summing up the scores of the 66 questions while student's satisfaction score was calculated by summing up the scores of the 19 questions. Differences in scores (%) were examined using chi-square or Fisher exact tests, as appropriate. The correlations and the reliability of the students' marks as assessed by two raters were tested using Spearman correlation coefficient and intraclass correlation coefficient (ICC), respectively. All P-values were two-tailed. P-value <0.05 was considered as significant. SPSS software (release 20.3, Armonk, NY: IBM Corp) was used for all statistical analyses.

3. Results

Table 1 shows the demographic and professional characteristics of the study population. Experts were typically non-Saudi (100%), females (95.2%), aged >40 years (66.7%), and who were working as lecturer (57.1%), assistant professor (28.6%), or professor (14.3%), with an average 20.2±9.2 years of experience. Novice instructors were typically non-Saudi (100%), females (100%), aged ≤40 years (57.1%), and who were working as lecturer (71.4%) or assistant professor (28.6%), with an average 14.6±6.5 years of experience. Students were typically Saudi (100%), females (100%), and aged 21-23 years (66.7%).

Expert opinion about the face and content validity and laboratory evaluation of the tool of the health assessment course is shown in Table 2. The percentages of experts (N=21) who had agreed or strongly agreed with different aspects of the tool were 90.8% (27.3% and 63.4%, respectively) for face validity, 95.3% (22.9% and 72.5%) for implemented techniques in the examination of body systems, 97.8% (26.5% and 71.3%) for performance checklist, 96.9% (20.3% and 76.6%) for student's version of evaluation instrument, 97.3% (20.2% and 77.1%) for instructor's version of evaluation instrument, 74.0% (27.8% and 46.3%) for student activities including assignments, case scenarios and documentations, 98.8% (14.3% and 84.5%) for implemented techniques in laboratory evaluation including sequence of laboratory session, and 70.3% (15.3% and 55.0%) for the process of laboratory evaluation, respectively. Overall, 90.1% (21.7% and 68.4%) agreed or strongly agreed with the validity and laboratory evaluation of the tool of the health assessment course.

Figure 1 shows the expert individual and overall scores as compared with maximum possible scores for face and content validity and laboratory evaluation of the tool of the health assessment course. Individual scores ranged between 81.5% and 96.5%, with 90.8% overall score. The highest scores were observed with implemented techniques in laboratory evaluation (96.5%) and instructor's evaluation instrument (94.9%) while the lowest scores were student activities (81.5%) and the process of laboratory evaluation (82.4%).

Comparison of the students' marks among 63 students assessed by two different experienced raters for system-specific and overall assessment skills during laboratory evaluation showed a very high reliability (Table 3). Out of maximum 120 marks, the average marks of overall system examination was 106.3±7.9 by the first rater and 106.4±7.8 by the second rater. The ICC for the two raters ranged between 0.961 and 1.000 for respiratory, cardio-peripheral, abdomen, head and neck (including eyes, ears, mouth, nose and throat), neuromuscular, and head to toe examination skills, with an overall ICC of 0.993. Similarly, the correlation of the marks of the two raters was very strong, with an overall Spearman correlation coefficient of 0.989.

Satisfactions of both novice instructors (N=7) and students (N=63) with different aspects of the relevant version of the tool of health assessment course (instructor's guide and student's manual, respectively) are shown in Table 4. Novice instructors who were either satisfied or very satisfied with different aspects of the instructor's guide were 98.9% (28.6% and 70.3%, respectively) for the guide content, 100.0% (14.3% and 85.7%) for performance checklist, 94.4% (23.3% and 71.1%) for evaluation instruments, 77.1% (37.1% and 40.0%) for student activities, 92.9% (19.0% and 73.8%) for implemented teaching techniques, 96.6% (32.2% and 64.4%) for the process of laboratory evaluation, and 93.5% (28.0% and 65.4%) for overall satisfaction. On the other hand, students who were either satisfied or very satisfied with different aspects of the manual were 90.5% (22.2% and 68.3%, respectively) for the manual content, 92.1% (23.8% and 68.3%) for performance checklist, 85.7% (27.0% and 58.7%) for evaluation instruments, 67.5% (17.5% and 50.0%) for student activities, 87.0% (24.7% and 62.3%) for implemented teaching techniques, 67.1% (23.2% and 43.9%) for the process of laboratory evaluation, and 81.6% (23.1% and 58.6%) for overall satisfaction.

Figure 2 shows the individual and overall satisfactions scores for both novice instructors (N=7) and students (N=63) as compared with maximum possible scores for different aspects of the relevant version of the tool of health assessment course. The individual satisfactions scores of novice instructors ranged between 82.6% (students' activities) and 97.1% (performance checklist), with an overall satisfaction score of 91.0%. The

individual satisfactions scores of students ranged between 77.1% (process of laboratory evaluation) and 90.8% (performance checklist), with an overall satisfaction score of 82.7%. Both individual and overall satisfactions scores were generally higher among novice instructors than students. This reached statistical significance with the overall satisfaction score (91.0% versus 82.7%, $p<0.001$), process of laboratory evaluation (91.3% versus 77.1%, $p<0.001$), implemented teaching techniques (92.9% versus 88.5%, $p=0.009$), and evaluation instruments (91.9% versus 86.6%, $p=0.019$).

4. Discussion

The current study evaluated a newly developed tool of health assessment course using different perspectives including academic experts and those who are directly involved in the educational process; novice instructors and students. Expert-validation of newly developed tools has been described before in different topics/modules in nursing education, such as the use of clinical simulation and assessment of clinical performance [11-13]. Unfortunately, the researcher could not identify any study that evaluated a tool for health assessment course. Experts in the current study gave a very positive overall evaluation for the developed tool for the health assessment course (including the student's manual and the instructor's guide), with more than 90% overall positive score. Experts were exceptionally gratified with the implemented techniques in laboratory evaluation and examination of body systems as well as evaluation instruments. On the other hand, the components that received less acknowledgement were student activities and the process of laboratory evaluation. Interestingly, the expert opinion about student activities including assignments, case scenarios and documentations was parallel to a relatively low satisfaction scores in both novice instructors and students. On the other hand, expert opinion about the process of laboratory evaluation was parallel to a relatively lower satisfaction score in the students but not novice instructors. The time allowed for laboratory quizzes was the main reason for the relatively less positive opinion towards the process of laboratory evaluation. For example, approximately 18% of the experts and 24% of the students believed that the time allowed for each laboratory quiz was not enough for the evaluation. However, none of the novice instructors shared the same opinion and additionally only 16% of the students expressed their wish to modify the time allowed for laboratory quizzes.

The reliability of the assessment instrument is fundamental for ensuring fairness and consistency of assessment across assessors, settings, and time [14]. Therefore, developing a holistic assessment tool with reasonable level of validity and reliability is eagerly needed in nursing education [14, 15]. The newly developed tool in the current study was highly reliable in assessing the students' skills during laboratory evaluation. This was manifested by almost identical average marks of overall system examination, as assessed by two different experienced raters. This finding was not surprising given the very positive opinion of experts towards the student and instructor's version s of the evaluation instruments (93% to 95%, respectively). Additionally, both novice instructors and students had high satisfaction scores (92% and 87%, respectively) towards the evaluation instruments. The current study calculated the ICC for the students' marks which is usually used to compare the agreement of two rates as a sign of the reliability of the tool used. It is worth mentioning that ICC values were also equivalent to Cronbach's alpha, which is usually used to examine the internal consistency of the tool itself. The ICC for the two raters in the current study (0.99) was better or at least comparable to the reliability of clinical assessment tools examined before [13-15]. For example, in a systematic review of 33 studies that examined the clinical competencies of final-year nursing students, only 4 studies showed reliability measures for the assessment tool with an average alpha ranging between 0.75 and 0.98 [14].

Student and faculty satisfactions are key components for quality nursing education and are required for accreditation of undergraduate nursing programs [16]. Additionally, student satisfaction was shown to be associated with retention and overall success of educational programs [17]. Therefore, it is important and beneficial to examine the student and faculty acceptance of newly introduced/modified health assessment course [7,8]. Both students and novice instructors in the current study had generally high satisfaction level with the tool of health assessment course. Both students and novice instructors were especially satisfied with the performance checklists and the guide/manual content, probably because of their direct impact on easier handing of the course. Nevertheless, students in the current study had slightly lower satisfaction than novice instructors (83% versus 91%). Similar finding was observed among students and faculty assessing clinical learning outcomes in nursing students in Kuwait [18]. As students in the current study were relatively less satisfied with their activities and the process of laboratory evaluation, these parts of the student's manual may need to be revised. For example, summarizing assignments and case scenarios so as to reduce the time needed to complete them in addition to allowing enough time for the laboratory quizzes. This would probably also help the instructors who felt to a relatively lesser extent that students' activities represent too much work for both students and instructors.

Although the current study is the first local study to evaluate a newly developed tool for the health assessment course using different perspectives including validity, reliability, and satisfaction of those who are directly involved in the educational process, the current study acknowledge some limitations. For example, the smaller number of experts and instructor included in the current study and the single center experience may limit

the generalizability of the finding. As we did not have a control group, we could not examine the effectiveness of the new tool in improving the student scores. Nevertheless, the researcher believes that this tool is a valuable addition to those who are directly involved in the health assessment course and may be recognized as a model to replicate in other nursing courses.

In conclusion, expert evaluation of a newly developed tool for the health assessment course showed more than 90% positive score for face and content validity including laboratory evaluation. The tool was highly reliable in assessing of students' skills during laboratory evaluation, as manifested by almost identical (0.99) average marks assessed by two different experienced raters. Both students and novice instructors had generally high satisfaction level with their respective version of the tool (83% versus 91%, respectively). Future studies are required to examine the effectiveness of the newly developed tool in improving the health assessment skills of the students and to assess how much of these skills are actually retained and practiced after clinical placement.

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Table 1: Demographic and professional characteristics of the study population

Experts (N=21)			Novice instructors (N=7)			Student (N=63)		
	N*	%*		N*	%*		N	%
Age (years)			**Age (years)**			**Age (years)**		
≤40	7	33.3%	≤40	4	57.1%	18-20	21	33.3%
41-50	10	47.6%	41-50	2	28.6%	21-23	42	66.7%
51-60	4	19.0%	51-60	1	14.3%			
Gender			**Gender**			**Gender**		
Female	20	95.2%	Female	7	100.0%	Female	63	100.0%
Male	1	4.8%	Male	0	0.0%	Male	0	0.0%
Nationality			**Nationality**			**Nationality**		
Saudi	0	0.0%	Saudi	0	0.0%	Saudi	63	100.0%
Non-Saudi	21	100.0%	Non-Saudi	7	100.0%	Non-Saudi	0	0.0%
Academic rank			**Academic rank**					
Professor	3	14.3%	Professor	0	0.0%			
Assistant Professor	6	28.6%	Assistant Professor	2	28.6%			
Lecturer	12	57.1%	Lecturer	5	71.4%			
Years of experience			**Years of experience**					
Mean±SD	20.2	9.2	Mean±SD	14.6	6.5			
<20	10	47.6%	<20	5	71.4%			
≥20	11	52.4%	≥20	2	28.6%			

* Number and percentage unless mentioned otherwise, SD, standard deviation

Table 2: Responses of experts regarding the face and content validity and laboratory evaluation of the tool of the health assessment course (N=21)

	Number of questions	Number of experts	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Agree or strongly agree
Face validity	7	21	0.0%	0.2%	9.0%	27.3%	63.4%	90.8%
Content Validity								
Implemented techniques in the examination of body systems	17	21	0.0%	0.0%	4.7%	22.9%	72.5%	95.3%
Performance checklist	7	21	0.0%	0.0%	2.2%	26.5%	71.3%	97.8%
Evaluation instrument, student's version	6	21	0.0%	0.0%	3.1%	20.3%	76.6%	96.9%
Evaluation instrument, instructor's version	7	21	0.0%	0.0%	2.7%	20.2%	77.1%	97.3%
Student activities (assignments, case scenarios and documentations)	3	21	0.0%	4.3%	21.6%	27.8%	46.3%	74.0%
Laboratory evaluation								
Implemented techniques (sequence of laboratory session)	3	21	0.0%	0.0%	1.2%	14.3%	84.5%	98.8%
Process of laboratory evaluation	11	21	0.0%	9.6%	20.1%	15.3%	55.0%	70.3%
Overall	61	21	0.0%	2.0%	7.9%	21.7%	68.4%	90.1%

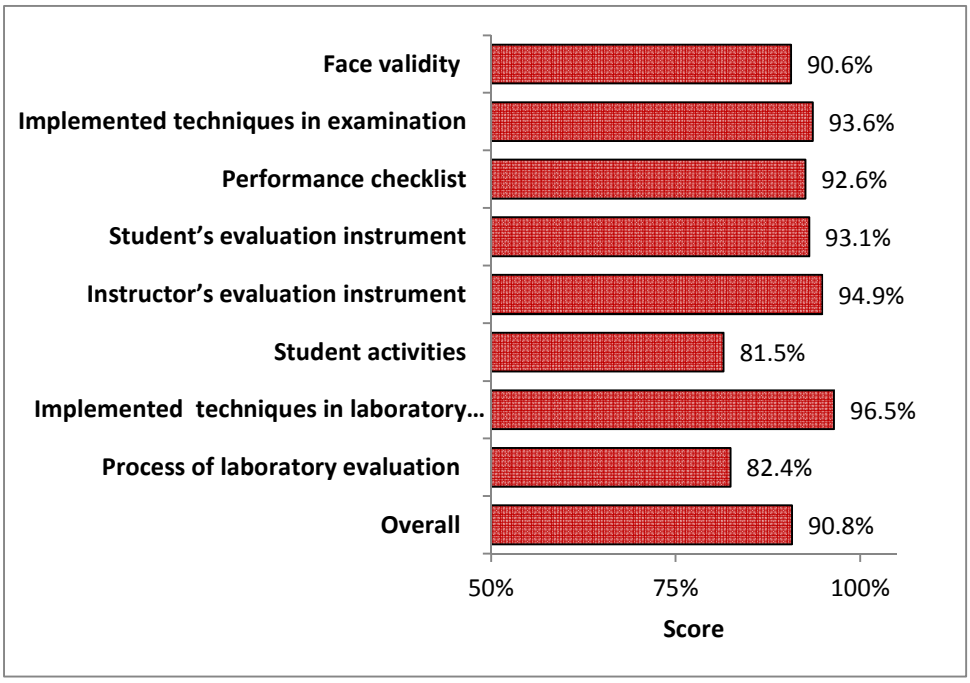

Figure 1: Scores of experts regarding the face and content validity and laboratory evaluation of the tool of the health assessment course (N=21)

Table 3: Comparison of the students' marks for system-specific and overall assessment skills by two different experienced raters

System examinations	Number of students	Maximum marks	Marks of first rater		Marks of second rater		Intraclass correlation		Spearman correlation	
			Range	Mean ±SD	Range	Mean ±SD	Coefficient*	p-value	Coefficient	p-value
System-specific examinations										
Respiratory	63	20	6.0-19.5	16.7±3.0	8.0-19.5	16.8±2.8	0.961	<0.001	0.981	<0.001
Cardio-peripheral	63	20	11.0-19.9	16.9±2.1	11.0-19.8	16.9±2.1	0.974	<0.001	0.984	<0.001
Abdomen	63	20	11.5-20.0	17.3±2.0	11.2-20.0	17.3±2.0	1.000	-	1.000	-
Head & neck	63	20	12.0-20.0	17.5±2.2	12.0-20.0	17.5±2.2	0.999	<0.001	0.997	<0.001
Neuromuscular	63	20	15.0-20.0	18.8±1.2	15.0-20.0	18.8±1.2	0.999	<0.001	0.985	<0.001
Head- to- toe	63	20	10.6-20.0	19.0±1.4	10.6-20.0	19.0±1.4	0.999	<0.001	0.984	<0.001
Overall system examination	63	120	82.8-117.8	106.3±7.9	86.0-118.0	106.4±7.8	0.993	<0.001	0.989	<0.001

* Intraclass correlation coefficient for the two raters is equivalent to Cronbach's alpha

Table 4: Satisfactions of both novice instructors (N=7) and students (N=63) with different aspects of the relevant version of the tool of health assessment course

	Number of questions	Number of individuals	Strongly dissatisfied	Dissatisfied	Neutral	Satisfied	Strongly satisfied	Satisfied or strongly satisfied
Novice instructors:								
Guide content	13	7	0.0%	0.0%	1.1%	28.6%	70.3%	98.9%
Performance checklist	1	7	0.0%	0.0%	0.0%	14.3%	85.7%	100.0%
Evaluation instruments	13	7	0.0%	1.1%	4.4%	23.3%	71.1%	94.4%
Students' activities	10	7	1.4%	10.0%	11.4%	37.1%	40.0%	77.1%
Implemented teaching techniques	12	7	0.0%	2.4%	4.8%	19.0%	73.8%	92.9%
Process of laboratory evaluation	17	7	0.0%	0.8%	2.5%	32.2%	64.4%	96.6%
Overall	66	7	0.0%	2.2%	4.3%	28.0%	65.4%	93.5%
Students:								
Manual content	1	63	3.2%	1.6%	4.8%	22.2%	68.3%	90.5%
Performance checklist	1	63	3.2%	0.0%	4.8%	23.8%	68.3%	92.1%
Evaluation instruments	1	63	4.5%	2.3%	7.5%	27.0%	58.7%	85.7%
Students' activities	2	63	0.0%	14.3%	18.3%	17.5%	50.0%	67.5%
Implemented teaching techniques	5	63	1.8%	2.0%	9.2%	24.7%	62.3%	87.0%
Process of laboratory evaluation	7	63	7.1%	11.5%	14.4%	23.2%	43.9%	67.1%
Overall	17	63	3.3%	5.3%	9.8%	23.1%	58.6%	81.6%

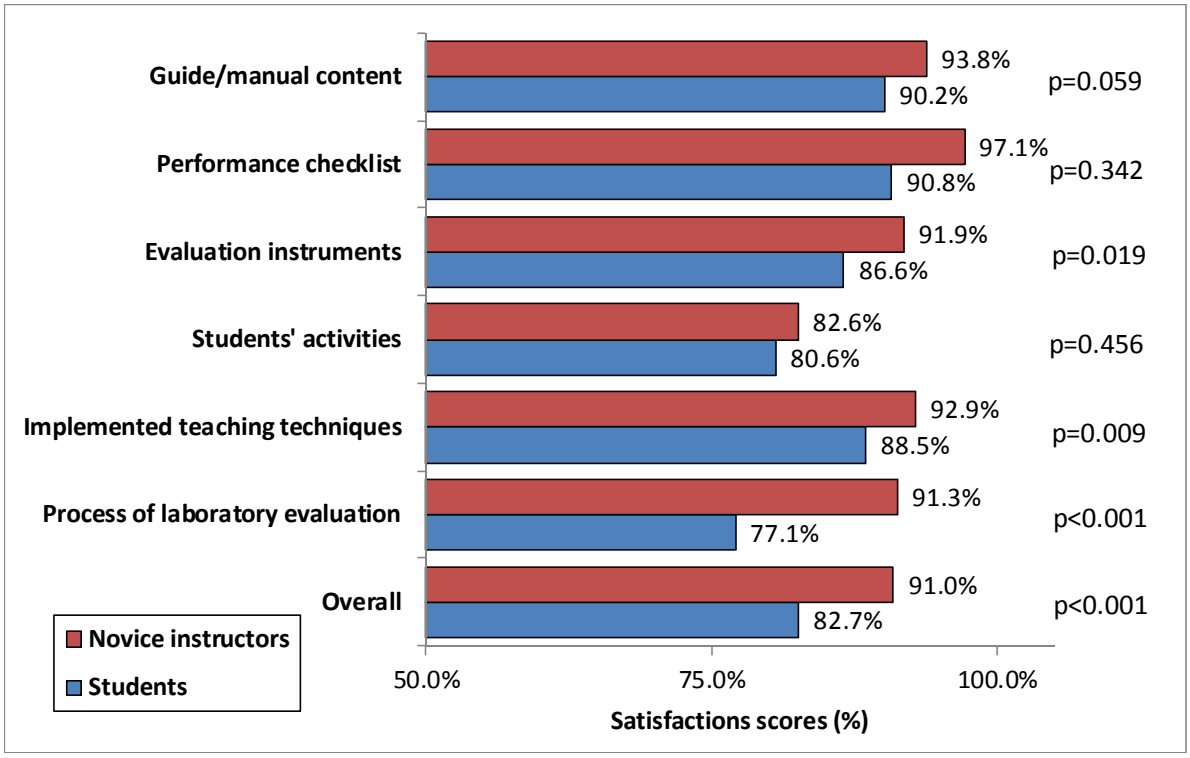

Figure 2: Satisfactions scores for both novice instructors (N=7) and students (N=63) with different aspects of the relevant version of the tool of health assessment course

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