Analysis of Multiple Choice Questions of the Second Semester Examinations Held in Zahedan College of Nursing and Midwifery in 2010-2011.

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Abstract: To assess the academic achievement of students, teacher-made or standardized tests such as the four-choice tests were used. Procedure: Out of second term examination answer sheets of seventeen faculty members, 452 questions were selected randomly and were read by SCN Mark-Reader device and analyzed.The examination was conducted in the second semester of academic year 2010-2011 at the college of Nursing and Midwifery, The anticipated difficult index set in the acceptable range of 0.3-0.7 and questions with index range less than 0.3 were considered difficult and questions more than 0.7 ranges as simple. Discrimination index more than 0. 3 considered acceptable and discrimination index less than 0. 3, and as well as negative discrimination index were considered unacceptable. If questions with distracting options were not. Selected by students as question choice they were also considered unacceptable. Results: Results showed that only 40% of the questions were indexed as difficulty co-efficiency (Difficulty Index) and 36.5% questions with discrimination co- efficiency (Discrimination Index) were considered acceptable. Out of every four options, only 41% of the questions attracted students' attention and rest of the questions became three, two or even one option, and only 12% of questions based on the above three factors were having acceptable attributes. Conclusions: The findings of this study indicate that the questions need to be reviewed and appropriate and suitable approaches were suggested to assess students' present accurate criteria.
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Background:

The purpose of education evaluation was to judge the value of each of the main elements of educational system, including the students. So that assessment results to improve teaching process were used to achieve the predetermined goals.

Assessment of student is one of the most important pillars of the learning planning, an effective evaluation method, and plays an important role in distinguishing student's distinction and result in producing motivation in students, and this method also help instructors to assess their activities, also it is based on suitable approach to solve students' learning problems. The style of evaluation from the scientific point of view also exerts influence on the method of students' study [1, 2, and 3].

Tests used to assess the students are divided into two categories, aptitude test, and study progress test. The first relates to future and the second concerns about the past and lessons learned in the past of individual. The purpose of progress test is to evaluate the level of learning and acquisition of needed skills of students [4]. Using the results of these assessments, apart from judgment of student's performance; we can use these results to judge the quality of teaching, methods and material of teaching. Therefore teachers should make maximum use of test results for revision of their assessment style and teaching.

Progress tests from the view point of preparation and development divided into standardized tests and professors -made test, that cover the course objectives and approve the personal experience of professors. These tests are divided into two groups: subjective and objective. Tests of subjective or interpretive are limited and poor questions but their contents are assessed accurately. But besides teachers' remark are directly affective on answer sheets and is very time consuming so interpretive questions are not well received by teachers [4], The survey reported that only 23.5% of basic science questions were in a descriptive evaluation form [5].But in the objective test like four

choice, the view of the teacher is not affective, (because the questions and answers would be given to students and they select the preferred answer and mark it on the answer sheet) and it is not too time consuming, therefore, the four options tests are used as the most common educational achievement evaluation method [6,7 and 8]. Although the use of four option test can evaluate more of its content, but if it does not comply with the principles of good design questions, these questions will be invalid [9]. These questions should have certain characteristics, including difficult index, discrimination index and distractive options that are followed appropriately. Designing multiple choice questions is not a complex process, but designing correct and distractive options is complex. More importantly, designing distractive options are as important as designing correct options, so that selection of correct option should be difficult for poor students.

In fact, we can say that the quality of multiple-choice test is based on the quality of distractive options. Certified disadvantages of the multiple choice questions which teachers are less concerned are as follow:

Questions are designed with insignificant details and least importance. Expertise and student confidence at the use of methods to delete the wrong options directly involved in obtaining a better score [4]. Losing marks by negative score in four choice questions has less relationship in pa ssing the test, while a negative score on the four-choice questions often is suggested "as a way to reduce speculation and chances. According to the above study in preparing multiple choice questions the following rules are to be considered:

A question can only be answered by those who surrounded content. Question should not be so simple the strong and weak students can proportionately answer them, and also the question should not be too difficult. Meritorious students should not be attracted by distractive options.

Distractive options should be apparently logic to attract both meritorious and poor student's attention.Options should be homogeneous in terms of content, because, homogeneous questions have more discriminating power.

The aim of our quantitative analysis of questions and survey of individual test question, and as well as evaluation of their options is to determine their strengths and weaknesses.

It should be clear whether the scores obtained in tests by students reflect students' knowledge and skills they acquired. Therefore, in this study we analyzed and discussed the different statistical acceptable parameters of the questions such as: difficulty index, discrimination index, and distractive options.

Methods: This descriptive - analytical study was done to elucidate the answer sheets of the second semester examination of academic year held in Nursing and Midwifery, college, Zahedan.2010-2011. Answer sheet samples were collected randomly out of all faculty members for survey. Of all 452 multiple choice-questions consisted of difficult index, discrimination index and distractive options were read and analyzed by SCN Mark- Reader. Since the difficult index is the first factor, it needs to be theoretically evaluated [10]At first difficult index has been surveyed. Difficult index is defined as percentage of students that have given right answer to each question correctly which is shown by P. The bigger is the difficult index of a question, the easier is the question, the smaller is the difficult index of a question, and the more difficult is the question. If the difficult index of a question is within the range of o.3 - o.7 it is acceptable and more than o.7 the question is considered easy, and less than 0.3 the question is considered difficult and questions beyond these indices are considered unacceptable. Discrimination coefficient questions distinguish the meritorious students from weak students and are shown by" d".

According to definition, the difference between meritorious and weak student answer to each question divided by the number of students in either of two groups is termed as discrimination index of a question. Questions with more than 0.3 discrimination index are acceptable and less than 0.3 are unacceptable [(4)]. In addition, identified questions with negative discrimination index are unacceptable. Because, negative discrimination index shows that weak students answer the questions correctly and meritorious students answer incorrectly that represents a fundamental problem in questions or options. Then, questions that satisfy simultaneously both acceptable difficulty index and discrimination index conditions were determined and there were options that even nobody chose them and questions of such options were also determined. These questions actually with "three options, and two options and even single option were also excluded. Since the distractive options of question should logically appear equally attractive to the student's attention, and thus result in equal chance of being selected by students who did not know the correct answers. Question with least selected two or more distractive options were also excluded.

Results:

The survey of 452 questions indicated that 65 questions (14.4%) had too difficult index. Of 452 questions 206 (45.6%) were too simple, and only 181 (40%) questions from the view point of difficulty index was acceptable (Table 1).

Table 1. The view point of difficulty index

Faculty member	Number of questions	Percentage of Difficult questions	Percentage of easy questions	Percentage of Incorrect questions	Percentage of correct questions
1	15	0.33	0.40	0.73	0.27
2	27	0.11	0.52	0.63	0.30
3	50	0.12	0.42	0.54	0.46
4	10	0.30	0.30	0.60	0.40
5	30	0.07	0.57	0.63	0.37
6	28	0.11	0.57	0.68	0.32
7	28	0.32	0.07	0.39	0.61
8	10	0.10	0.50	0.60	0.40
9	19	0.32	0.32	0.63	0.37
10	37	0.19	0.14	0.32	0.68
11	40	0.10	0.55	0.65	0.35
12	25	0.20	0.32	0.72	0.28
13	26	0.19	0.65	0.85	0.15
14	21	0.10	0.38	0.48	0.52
15	34	0.03	0.71	0.74	0.26
16	31	0.00	0.52	0.52	0.48
17	21	0.14	0.43	0.57	0.43

Difficult index of exam questions from different lecturers.

From the view point of obtained Discrimination Index it is clear that 165 (36.5%) questions out of 452 questions with higher Discrimination index more than 0.3 were considered acceptable. And 204 (45.3%) questions with discrimination index less than 0.3 and 83(18.2%) questions with negative discrimination index and in total, 63.5% questions were considered unacceptable (table 2).

Table 2. Questions with negative discrimination index and in total

Faculty member	Number of questions	Percentage of question with discrimination index more than 0.3	Percentage of question with discrimination index less than 0.3	Percentage of question with negative discrimination index.	Percentage of question with unacceptable discrimination index.
1	15	0.26	0.47	0.27	0.74
2	27	0.22	0.63	0.15	0.78
3	50	0.5	0.34	0.16	0.50
4	10	0.2	0.3	0.5	0.80
5	30	0.7	0.23	0.07	0.30
6	28	0.39	0.29	0.32	0.61
7	28	0.29	0.54	0.18	0.71
8	10	0.3	0.3	0.4	0.70
9	19	0.05	0.53	0.42	0.95
10	37	0.3	0.57	0.14	0.70
11	40	0.38	0.43	0.2	0.63
12	25	0.28	0.6	0.12	0.72
13	26	0.15	0.73	0.12	0.85
14	21	0.52	0.33	0.14	0.48
15	34	0.41	0.53	0.06	0.59
16	31	0.42	0.45	0.13	0.58
17	21	0.43	0.29	0.29	0.57

Discrimination index of exam questions from different lecturers

A total of 181questions with difficulty index and 165 questions with discrimination index have been considered acceptable. Only 80 questions equivalent to 17.7% of all questions had both acceptable difficult index and discrimination index concomitantly. And out of these 80 questions with above two situations, 30 questions with

one or two distractive options were not selected by any one. And only 50 questions (11%) with four choice questions were considered acceptable. (Table: 3).

Table 3. Choice questions were considered acceptable.

Faculty member	Number of questions	Percentage of question with acceptable. Difficult and discrimination indices.	Percentage of question with options not selected.	Percentage of questions with two unacceptable options.	Percentage of acceptable question	Percentage of total correct questions
1	15	0.13	0.50	0.00	0.50	0.07
2	27	0.19	0.50	0.50	0.00	0.00
3	50	0.28	0.43	0.07	0.50	0.14
4	10	0.00	0.00	0.00	0.00	0.00
5	30	0.27	0.25	0.13	0.63	0.17
6	28	0.14	0.25	0.00	0.75	0.11
7	28	0.18	0.50	0.00	0.50	0.07
8	10	0.10	1.00	0.00	0.00	0.00
9	19	0.05	0.00	0.00	1.00	0.05
10	37	0.19	0.00	0.00	1.00	0.19
11	40	0.15	0.33	0.50	0.17	0.03
12	25	0.08	1.00	0.00	0.00	0.00
13	26	0.08	0.00	0.00	1.00	0.08
14	21	0.38	0.13	0.25	0.63	0.24
15	34	0.15	0.80	0.00	0.20	0.03
16	31	0.26	0.50	0.25	0.25	0.06
17	21	0.19	0.50	0.25	0.25	0.05

Survey of distractive options of questions with acceptable difficult and discrimination index.

On the other hand out of 452 questions, only four options of 185 questions (41%) attracted the student's attention. Three distractive options of 36(8%) questions and two distractive options of 86 (19%) questions and single distractive option of 145 (32%) questions were not selected by any one. Which collectively indicate that 267(59%) questions as four options tests were not acceptable (Table 4).

Table 4. Questions as four options tests

Faculty member	Number of questions	Percentage of questions with three unselected options.	Percentage of questions with two unselected options	Percentage of questions with one unselected option	Percentage of total questions with unselected options	Percentage of total questions with correct options.
1	15	0.07	0.40	0.33	0.80	0.20
2	27	0.26	0.37	0.11	0.74	0.26
3	50	0.10	0.32	0.18	0.60	0.40
4	10	0.00	0.10	0.00	0.10	0.90
5	30	0.03	0.17	0.23	0.43	0.57
6	28	0.14	0.11	0.54	0.79	0.21
7	28	0.00	0.00	0.18	0.18	0.82
8	10	0.10	0.10	0.20	0.40	0.60
9	19	0.05	0.16	0.26	0.47	0.53
10	37	0.00	0.03	0.24	0.27	0.73
11	40	0.08	0.15	0.30	0.53	0.48
12	25	0.16	0.12	0.56	0.84	0.16
13	26	0.08	0.31	0.27	0.65	0.35
14	21	0.10	0.14	0.38	0.62	0.38
15	34	0.06	0.26	0.56	0.88	0.12
16	31	0.00	0.19	0.52	0.71	0.29
17	21	0.10	0.19	0.33	0.62	0.38

Percentage of questions with one, two, or three unselected options.

Discussion and Conclusion: This study showed that 14.4% of questions were too difficult to answer, and 45.6%of questions were too simple, and only 40% of questions with difficulty index were acceptable. And 60% of questions either too difficult or too simple were considered unacceptable. In another study, Heidary reported 60% of the nursing and midwifery students test questions at Shahed University, showed difficulty index above 70% And 10% of questions showed difficulty index less than o.3 and only 30% questions were having acceptable difficulty index [11]. Kazemi's study indicated in special courses of Mid-wifery students in Isfahan more than 52% questions were easy and most common and 8.5% were difficult questions and 38% were appropriate questions, And lowest percentage of frequencies of difficult co-efficient questions were common[12].Dadgary's study in Shared University indicated that more than 58% were easy and 15% were difficult and only 27% were acceptable questions, respectively [13].

Study of Darakhshan at Qazvin University of Medical Sciences indicated that more than 50.2% questions were easy and 15% were difficult questions and only 34.8% were acceptable questions14. And these findings are confirmed by other studies, [15] .Our study results are more or less consistent with results of Heydari and Kazami and Dadgari and Dharakhshan. It indicated that more than 50% of simple questions in evaluation of students were deployed rather than medium questions. At the same time difficulty index questions less than o.3 were with lowest frequencies and it is necessary the design of simple and difficult questions should be reconsidered. Percentage of acceptable questions of this study was better than studies of Heidari and Kazami and Dadger and Dharakhshan. But we should consider that the difficulty level of questions is appropriate to the learners' ability and learning goals, If it is well-thought out that the very simple or very difficult questions damage the validity of the test. Since, moderate difficulty index would enhance the reliability of the tests, hence the importance of difficult index is more clear [16] In surveying the discrimination coefficient questions, the results indicated that more than 45.3% of questions had discrimination index less than 0.3 and more than 18.2 % of questions showed negative discrimination index and only 36.5% revealed acceptable discrimination index. Kazemi study in Isfahan showed that more than 26% of lessons had more than 50% of high discrimination coefficient questions, but in overall 44% of questions had high discrimination co-efficiency and 39% of questions showed moderate discrimination index, and 17% revealed negative discrimination index. Dadgar study in Shahrudh University indicated 4.5% of high discrimination coefficient questions and 72% of moderate discrimination coefficient questions and 22% of negative discrimination coefficient questions. Study of Dharakshan showed 15.1% moderate discrimination coefficient questions. More than 48.3% showed low discrimination coefficient questions and 36.6% of negative discrimination questions that were unacceptable.

The results of this study and other studies (Kazemi and Dadgar and Dharakshan) showed differences in the percentages of acceptable and unacceptable and negative discrimination coefficient questions, but the two following features are the same:

The first similarity in these studies questions of acceptable discrimination co -efficiency was within the range of 4.5%-44% which is too low. The second similarity with the series of above studies is that the negative discrimination co-efficient questions were in the range of 17%-36.6% which was too high and this meant that the poor students answered questions correctly and the meritorious students with additional information answered wrongly. If discrimination index is very weak it shows basic problem and objection of those questions and optional [17]. Low discrimination co-efficient questions of this study and other studies can be caused by various factors in terms of: the first factor is the difficult index of questions because the highest discrimination index is obtained when the difficult index is within the range of 0.4-0.8. [18]. because more than 63% question of this study was too easy or too difficult, therefore frequency of acceptable discrimination index of questions is very low, in addition discrimination index has negative correlation with difficult index, high percentage of questions showed high difficult index and therefore there, discrimination index is low. [19]

The second factor may be poor discrimination index questions were due to use of ambiguous words or just vague options [20]. In this study 18% of questions were of negative discrimination index, however within the above range is acceptable, but itself is too high.

Negative discrimination index represent basic problems in the stem of questions or options, it is noteworthy that one of the major factors affecting the reliability of the test is the high number of questions with high discrimination index [4]. The findings also indicated that only 41% of distractive options were selected by students and three options of 8% of questions were not selected by any one and it meant that 8% of questions were transformed to single option question. and in a similar way 19% and 32% of questions were transformed to two options and three

options questions, respectively. Distractive options are important in realizing students' inappropriate learned lessons. Distractive options should not be totally wrong, but should be in a form it relates to question topics. Selection of distractive option may be due to incomplete knowledge of students or may be due to poor structure of question.

Distractive options are appropriate only if poor students are more attracted than meritorious students. At the end this question is raised, whether there are essentially meaningful relations between level of knowledge and gained scores of such tests with above features [21]. And finally such standards of multiple choice questions are whether accurate for evaluation of students [22, 23].

Conclusion:

The results of this study showed at first "in designing multiple choice questions necessary accuracy is not observed". And questions were lacking minimum required principles that are sometimes the questions were too simple or too difficult and sometimes discrimination index was too low and even negative. And sometimes four choice questions were transformed to three choices, two choices and even one choice option. In general it can be concluded that teachers in the field of designing multiple-choice questions and analysis and interpretation of them require more training.It is necessary that the universities hold question designing workshops for faculty members.

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References

1- Hammond EJ, McIndoe AK, and Sansome AJ, et al. multiple choice examinations: adopting an evidence-based approach to exam technique. Anesthesia 1998; 53 (11); 1105-8.
2- Rassaian N, Ghandehari NS, Nakhaei S e al. Attitude and academic performance of medical students in research-centered teaching method. Med J Islam Rep Iran 2000; 14(3): 253-60.
3- Rasaian N. Long-term memory and learning through the use of research-centered teaching method. J Med Edu 2001; 1 (1): 38-42
4- Seyf AA. Measurement and assessment tools in education. Daavaran publ, Tehran, Iran, 1999. (Persian)
5- Komeile GR, Rezai A. [Methods of student assessment used by faculty members of basic Sciences in medical university of Zahedan]. Iranian Journal of Medical Education 2001; 1(4): 49-53. (Persian)
6- Mavis BE, Cole BL, Hoppe RB. A survey of student assessment in U.S medical schools: The balance of Breath versus fidelity. Teaching and Learning in Medicine 2001; 13 (2): 74-79
7-Considine J, Botti M, Thomas S. Design, format, validity and Reliability of multiple choice questions for use in nursing research and Education. Collegian 2005; 12: 19-24.
8- Irish B. Preparing for multiple choice papers. Practitioner 2005; 249:124 - 127.
9- Downing SM. The effects of violating standard item writing principles on tests and students: the consequences of using flawed test items on achievement examinations in medical education. Adv Health Sci Educ Theory Pract 2005; 10(2): 133-43.
10- McAlpine M, Hesketh I. Multiple Response Questions- Allowing For Chance in Authentic Assessments. In 7th International CAA Conference (Ed, Christie, J.) Loughborough University, Loughborough. 2003.
11- Heidari M. The analysis of the achievement tests performed in shahed Nursing and midwifery faculty. Iranian Journal of Medical Education 2004; 10: 120. (Persian).
12- Kazemi A, Ehsanpour S, Hassanzadeh A. Investigating the Academic Achievement Evaluation of Specialized Theoretical Courses of Midwifery BS Iranian Journal of Medical Education 2010; 9(4): 346-354.
13- Dadgari A, Ebrahimi H, Hassani MR, Mashyekhi Y. [Analysis of the comprehensive nursing final

exam in Shahrod faculty of medical sciences]. Shahrekord University of Medical Sciences Journal 2003; 4(4): 4-10.

14-Darakhshan F and Jahany Hashemy H. Evaluation of final exam of different Subjects in Ghazvin University of Medical Science in 1386-87. Bulletin 10th congress of medical education .Shiraz University of Medical Science, 1388, pp 308. (Persian).

15-Kaveh Tabatabaee M, et al. Analytic assessment of multiple-choice tests. Journal of Medical Education 2003; vol.2, No2.

16- Meshkani, Z., Hossein Abadie F. Multivariate analysis of factors influencing reliability of teacher made tests. Journal of Medical Education. 2005; vol.6, No2.149-152.

17- McAlpine M, Hesketh I. Multiple Response Questions- Allowing For Chance in Authentic Assessments. In 7th International CAA Conference (Ed, Christie, J.) Loughborough University. 2003.

18-Si-Mui Sim BSc, PhD, Raja Isaiah Rasiah Relationship between Item Difficulty and Discrimination Indices in True/False Type Multiple Choice Questions of a Para-clinical Multidisciplinary Paper. Ann Acad Med Singapore 2006; 35:67-71.

19-Mitra N K, Nagaraja H S, Ponnudurai G, Judson J P. The Levels of Difficulty and Discrimination Indices in Type A Multiple Choice Questions Of Pre-clinical Semester 1 Multidisciplinary. IeJSME 2009: 3 (1): 2-7.

20 - Baner D, Kopp V, Fischer MR. Answer changing in multiple choices assessment change that answer when in doubt and spread the word BMC Med Education. 2007; 7: 28.

21- Hadi N, Shiraly R. Medial interns' knowledge about hypertension in Shiraz University of Medical Sciences. Iranian Journal of Medical Education 2005; 5(2): 176-81. (Persian).

22- Davies P. (2002) there's no confidence in Multiple–choice testing… Proceedings of the 6th international CAA Conference, Loughborough, pp 119-130.

23-Rassaian N, Sadegi Ghandehary N, Nakhaei S. Comparison of three exam techniques in medical students: multiple-choice, true-false and short answer questions. Hakim Research Journal, winter 1381; vol. 5, No 4. 271-278. (Persian).

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