COMPARISON OF ITEM DISCRIMINATION INDICES OF DIFFERENT FORMATS OF MULTIPLE DISCRIMINANT TYPE AND MULTIPLE CHOICE TEST ITEMS

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Abstract

The present study attempts to compare the Item Discrimination of Multiple Choice Items (MCI) and different formats of Multiple Discriminant Type Test Items (MDTI). The researcher developed a test with different formats i.e. MDTI with two stems and eight options and MDTI with two stems and six options and MCI with three options for comprehension of concepts of the course ‘Measurement and Evaluation’. The three developed formats were administered on a sample of 635 students selected randomly from Teacher Training Colleges of different Universities. Two least frequently chosen options were removed and the test was reduced to two stems with six options. The test was further reduced to separate parts of one stem and three options ones using the exposed analysis. The data were analyzed using Repeated Measure one way ANOVA. Results indicated that the Mean Item Discrimination indices of MDTI with two Stem Eight Options, two Stem Six Options and MCI with one Stem Three Options differ significantly.

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INTRODUCTION

Education system is inconceivable without evaluation in the same form. Though there are many different types and variations of items such as– Multiple choice, Permutation Multiple Choice Question (PMCM), Multiple Discriminant Type Test Items (MDTI), True-False, Matching, Short answer, Essay type etc. Multiple Choice Test Item is one of the most popular test items which is used in various Competitive exams like GRE, NET, IAS, NDA etc. In Multiple Choice Test with four Options students answer simply through guessing with 25% success. For the reducing the percentage of guessing, a new test item has been suggested i.e. Multiple Discriminant Type Test Items (MDTI). A Multiple Discriminant Type Item (MDTI) consists of more than one stem, say two or three with eight or Twelve Options (as one against one item (stem) and four or three
options in multiple-choice item). The alternatives are constructed in such way that they work as distractors for all the two or three stems/items. Each stem has one correct answer or key. This type of test items significantly reduces the chances of guessing in comparison to MCI.

A great number of the researches in the field of education across the world is currently focusing on Types of Test Items. Some of the earliest among researchers viz Stratton and Catts (1980), Owen and Froman (1987), Cizek and O’day (1994), Bruno and Dirkzwager (1995) & Abad, Olea and Vicente (2001) focused their researches on optimal number of alternative choices in a multiple choice test item. They recommended and concluded that three alternative multiple-choice test items, in typical classroom settings, were optimal. Also Trevisan, Sax and Michael (1991) found that the reduction of number of options had no material effect on internal consistency reliability. Plumlee (1952), Elley & Mangubhai (1992), Chan and Kennedy (2002), Hastedt & Dirk (2004) conducted studies to investigate the effect of different format of questions. Plumlee (1952), Elley & Mangubhai (1992) found that the answer format does not have a statistically significant difference on the result, whereas Chan and Kennedy (2002), Hastedt & Dirk (2004) found that the answer format has an effect on the result of the given item. Multiple Choice items are solved on average statistically significantly better than Open-ended items.

Farthing, Jones & Mcphee (1998) analysed the Permutational Multiple Choice Questions and Essay Type Questions. It was found that the PMCQs did not adequately discriminate between the stronger and the weaker candidates. A correlation of only 0.598 was disappointingly low. This meant some weaker candidates did well with PMCQs, and a few stronger candidates did slightly worse. In the second trial in 1997 they found differences between three correlation coefficients to be statistically insignificant. That means every section of the exam paper discriminated equally well between the stronger and weaker candidates.

Swanson et al. (2006) investigated the impact of item format and number of options on the psychometric characteristics and response time for MCIs. They found that test of items with more options were harder and required more testing time. No differences in item discrimination were observed.

Coderre et al. (2004) studied the effect of MCI and EMI (Extended Matching Items) formats on the problem solving strategies. The results showed that two formats were equally potent in testing problem solving abilities, and the number of alternatives did not have significant impact on psychometrics or problem solving strategies utilized. During testing problem solving strategy the question stem or content was more important than the number of alternatives.

Banerjee (2004) developed a validated test in Statistics for B.Ed measurement and evaluation course using MDTI. The investigator evaluated MDTI from the point of item discrimination, item difficulty, reliability and validity. The major findings of the study were: the reliability of test was .77. The correlation coefficient of only one item with the whole test was not significant. Rests of the items were found to be valid.

The findings of different studies cited here are a bit inconsistent. Moreover, no study has been undertaken on comparing the Discrimination Indices of Different Formats of Multiple Discriminant type test item with Multiple Choice Test Items. Hence, the present study was undertaken.
OBJECTIVE

The Objective of the present study was formulated as below:

To compare the Mean Item Discrimination Indices of MCI with Three Options, MDTI with Two Stems Eight Options and MDTI with Two Stems Six Options test format respectively.

HYPOTHESIS

The following was the hypothesis of this study:

There is no significant difference in the Mean Item Discrimination Indices of MCI with Three Options, MDTI with Two Stems Eight Options and MDTI with Two Stems Six Options test formats respectively.

SAMPLE

The sample was selected randomly. The present study was conducted on B.Ed. & M.Ed. students of different universities i.e. D.A.V.V. Indore, Lucknow University, Allahabad University, Meerut University and Banaras University of 2007-08 academic sessions. The sample comprised of 635 students in all.

TOOLS

The investigator developed Achievement Test with different formats of Test Items i.e. MDTI with two stems and eight options (ii) MDTI two stems and six options and (iii) MCI with one stem and three options on Measurement and Evaluation subject. Initially an MDTI with two stems eight options Achievement test was developed. It had 80 questions; after try out of items and following the item analysis 24 inferior questions were dropped. Finally, 56 questions were retained in the test. Then the comprehension test having MDTI with two non-functioning options removed i.e. comprising of two stems and six options was further reduced to two MCI with three options each. Each test format had 56 Questions. One mark was given for each correct answer. Thus, the marks could range from 0 to 56. The Medium of the test was Hindi as well as English.

PROCEDURE OF DATA COLLECTION

The Heads of the selected colleges were requested for permission to conduct the study within the college premises. Following the rapport with the students, the selected test were administered with instructions. Firstly, having administered the test of MDTI with two stems and eight options on a small initial sample the responses were scored carefully and analysed empirically. Then from that test two non-functioning options were removed leading to another format of MDTI test i.e. MDTI with two stems and six options. This test was further reduced to MCI format with one stem and three options. After developing all the formats of the test, all three tests were administered on different sample of students.
RESULTS

Firstly, Item Discrimination Indices for each item in the Three Test formats were computed. The data were then analysed with the help of Repeated Measure One Way ANOVA through GLM in SPSS. The results regarding the assumption of normality for Item Discrimination Indices of Three Test Formats are given in Table 4.3.0 below.

Table 4.3.0

One-Sample Kolmogorov-Smirnov Test for the Item Discrimination Indices of Three Test Formats

<table>
<thead>
<tr>
<th>Most Extreme Differences</th>
<th>Absolute</th>
<th>+Ve</th>
<th>-Ve</th>
</tr>
</thead>
<tbody>
<tr>
<td>MDTI with Two Stems Eight Opts.</td>
<td>0.3366</td>
<td>.08087</td>
<td>.129</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.129</td>
<td>-.082</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.965</td>
<td>.310</td>
</tr>
<tr>
<td>MDTI with Two Stems Six Opts.</td>
<td>0.3487</td>
<td>.08045</td>
<td>.081</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.081</td>
<td>-.069</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.606</td>
<td>.856</td>
</tr>
<tr>
<td>MCI with Three Options</td>
<td>0.2880</td>
<td>.07805</td>
<td>.112</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.112</td>
<td>-.083</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.841</td>
<td>.479</td>
</tr>
</tbody>
</table>

Table 4.3.0, shows that the three Z-values of K-S test of all the Test Formats are not significant at 0.05 level, meaning that normality of distributions of discrimination indices of all Three Test Formats can safely be assumed. Before Performing Repeated Measure One Way ANOVA and its proper interpretation Mauchly’s Test of Sphericity was conducted. The results are given in Table 4.3.1 below.

Table 4.3.1: Mauchly’s Test of Sphericity for the Item Discrimination Indices in Three Test Formats

Prof.RP Sharma
Former Head and Dean,
Education, University of Delhi

12.08.04
There is hardly any soul in India today, who would not feel happy and proud at the pomp and pageantry displayed at the India gate and other venues on the 63rd Republic Day. As the martial sounds of the march past and the fly past drown away and spur people on to attend to their daily chores, I settle down to marshal my disquiet which is somewhat inseparable from my nature. Unmistakably this disquiet is of philosophical nature, which more often than not, tugs at the educational scenario prevailing in our country. What better way and opportunity to vent and share this intellectual discomfiture with —“co-brethren of the quill” — (an expression used to identify those who belong to the same profession) all through the medium of your newborn Journal.

Not long ago there was a news item, well-publicised that none of the Indian universities finds any spot in the first hundred top ranking universities of the world. This news byte must have stung every thinking being who is directly or indirectly related to the field of education per se and the universities in particular. Just setting aside the voracity and the mechanism of arriving at this judgement, it does jolt every sensitive being to introspect and invite an inquest into the state of affairs in this domain. What follows is not only a brief impromptu prologue of the well thought out dialogue in which I intend to engage myself and others in future, time on our part and space on the part of the Journal permitting. I am sure there are issues and problems aplenty in the field of higher education, teacher education notwithstanding, which provide grist to the mill for encounters of the intellectual kind.

Triggered by the happenings in the recent past one is bound to reflect on the nature and functions of a modern university particularly in the context of India. The theme unmistakably leads one to thumb through the writings of Cardinal Newman (the idea of University), Abraham Flexner (the idea of modern university) as also that stimulating exposition of the subject by Karl Jaspers (the idea of University) - translated by Karl W Deutsch.

‘The soul of a people is well mirrored by the universities they establish’, holds Lord Haldane and the universities in India are no exceptions, even while suffering yawning social lag, and in some cases even the academic lag. That the products of our universities are no match to the ones belonging to the advanced nations, could be an overshot, perhaps expressed by the minds who would have their own yardsticks to measure academic standards or even their commercial interests to minister. But one must not fight shy of examining one's own standpoint.

One way of debating these issues regarding the health of these citadels of higher learning is to look into how the scholars and scientists of different hues and dispositions respond to the major concerns of the universities and other autonomous research and professional institutes for our immediate purpose, Flexner mentions four such concerns:

1. the conservation of knowledge and ideas
2. the interpretation of ideas
3. the search for truth
4. the training of students who would practice and “carry on”
   certainly this list of functions would swell as we launch into the formulation of an ideal template or the actual variants are available and others in the embryo, in India.
To this repertoire of functions Jaspers would like to add ‘creative cultural life’ which is very much linked to the other functions of academic teaching and scientific and scholarly research. These functions underlying the need of intellectual dialogue and communication for which the whole universe would be a campus.

One may hardly disagree with the common import of what the universities stand for. The Oxbridge model the German and the American ones together with the French model have all their own distinct flavour and intellectual fermentation.

The issue before us is whether we are to exist and flourish? Only in the shadow of the so-called Ivy institutes as the fountain heads of knowledge and learning or we have the traditional wisdom – the cultural capital, and the inner thrust to create our reconstruct our own centres of learning, and without insulating ourselves from the creative wisdom and scholarship of other cultures and centres of learning.

Equally contentious is the question whether the academic word ought to be shaped in accordance with the immediate needs and aspirations of the society or it must discover and rediscover its own wit and genius which could thrive without being a social weathercock. The latter position may fly in the face of the growing economies and democratic polities. Can we cling to a set pattern of some ‘academic constants, without being alive to the ‘civilisational variables’?

One is provoked to ask the tone and the tenor of the academic interaction, the inner dynamics of the University community composed of scholars and scientists, who are either pliant or defiant and a few free wheelers. How would the assertive democracies view the sacred precincts of knowledge as a closed society?

Do we agree with the two statements I have culled from Flexner’s work:

1. Universities must at times give society not what society wants, but what it needs. Inertia and resistance have their uses provided they be based on reasonable analysis, on a sense of values, not on mere habit.

2. The University professor has an entirely objective responsibility – a responsibility to learning, to his subject and not the psychological or parental responsibility for his students. No fear that he will in consequence be dehumanised.

The sting is in the tail, and obviously some of us are bound to be at variance with this skewed argumentation. Democracy has its premises no less profound than the ones cited above.

I now switch on to another significant aspect of University affairs, more so in the context of the quality of what universities produce – the obvious reference point is the curriculum that various faculties and disciplines trot out in the name of generation of new knowledge and education in its application. Considering that curriculum has an architectonic value for higher education, a periodic auditing of its design, direction and development becomes imperative to retain its health and sustain its progress.

Zeroing on the Indian knowledge-scape how do we view the adage that no sane human being can transcend his own epoch – how far are the universities in India, of all types, are faithfully
responding to the needs and aspirations of the knowledge economy as also the prerequisites of a pluralistic polity?

To what extent and measure can we allow the cosmos of knowledge to be inhabited by positive sciences and technologies only costing a pervasive impact on the lifestyle, attitude and values, that too eclipsing the very survival of humanity based disciplines? The pitch is queered by the market forces which call all the shots. Social sciences, with the exception of economics have to adorn the mantle of sciences to acquire respectability, with an articulate disdain for disciplines which raise questions of the first order, such as philosophy which has and in its essence still can, mother natural sciences. Aristotle has upstaged Plato and Socrates. The defences of these developments are to be found in diversity, speed, specialisation and entrepreneurial expressions.

The issues regarding epistemology and the modus operandi of the present educational dispensation strike an other distinct cord. And then, there is a whole field of education - its disciplinary problems, the nature and quality of teacher training courses which need oxygen and other resurrecting treatments. But these and many more problems will constitute the agenda for the future engagements.

I have just broached the issues, nibbling at a sample of the enormous problems that constitute the corpus of University learning, without discussing the full implications. The scholarly and reflective faculty members of this university and other institutions must have their own honoured standpoints and their weltanshauung to put forth their line of thought. Education being the meeting spot we are bound to develop a CRITIQUE OF PRACTICAL (USEFUL) EDUCATION as also the CRITIQUE OF PURE EDUCATION, in the fashion of Immanuel Kant. Your response(s) would definitely be valued and publicised, hopefully through the instrument of this Journal.

My felicitations to you and all other faculty members of this Department for providing the much-needed forum for creative thoughts and expression. Sincerely hope it becomes viable in all respects.

12.08.08