NATURE AND LIMITATIONS IN CONFINING MEASUREMENT AND EVALUATION OF COGNITIVE ACTIVITIES OF STUDENTS TO THE END PRODUCT

Western Classical Measurement and Evaluation Theory is based mainly on four conditions. They can be named as :

(1) Abilities of men are innate; thus they cannot be factually changed;

(2) Higher level of development in abilities is rarely seen. As a whole abilities of people develop in accordance with the normal distribution of abilities ;

(3) Testing confines to the end product of the measuring ability ; the nature of the ability and its application in solving diagnostic problems are not taken into consideration ;

(4) The quantitative approach to measurement and evaluation of abilities.[1]

The construction, administration and analysis of the results of Classical Western Tests are based on these conditions. Throughout its development Western Test Theory has not shown any significant progress in weakening these conditions. In other words though there have been experimental attempts to show the unscientific basis of these conditions which have provided the foundation for Western Test Theory, any significant change has not taken place in the nature and structure of Western Testing Systems.

Sri Lanka, being under the British occupation nearly for two and a half centuries, inherited the British system of Education and was forced to adopt British methods and principles of testing which upto the present reflect the structure and methods of British and American Testing Systems. As a result of this the conditions mentioned above which provide the basis for Western Test Theory are present in our Testing System also.

In our country where an unusual value has been given to examinations, the examination certificate has become a "pass port" to higher education and job opportunities. As a result of this the value of examinations has been overemphasized and the objectives of education have gradually become

1. N. F. Talyzina, Principles of Soviet Psychology and Problems of Psycho-Diagnosis in Cognitive Activities. In: *Psycho-Diganostics and School.* (Tallin, USSR. 1980). p. 54. (In Russian).

subordinated to examination success. Educationists have noticed that our examinations are not fulfilling a subsidiary function in the education system but contrarily the system of education has been oriented to examination giving an unusual importance to examinations. This in an educational point of view is harmful as the students, parents as well as teachers have taken success in examination as the sole aim in education by giving least consideration to other commendable educational objectives. [2], [3], [4], [5]. In a situation where the highest consideration is given to examination success, a condition of the Classical Test Theory i.e. the confinement of evaluation to the end product of the ability enteartins a strong place in our testing system. It is the aim of this article to inquire into the nature and limitations of confining measurement and evaluation to the final product of the ability which is subjected to measure.

It is the practice in Sri Lanka to decide the success of students by taking into account the final score they obtain in examinations. Various important decisions are taken about students standing on the marks they obtain in public examinations. Selection for jobs, higher education and awards of scholarships are some functions fulfilled by test scores. How far a final test score will indicate the real level of knowledge or skills of students is a problem which should be taken into consideration by psychologists and testologists.

As far as a programme of testing comprises a component part of any education system, the psychological basis for the testing programme is derived from the psychological theory that gives the basis for education process, which is accepted and applied by the given system of education. Therefore to investigate the cause that has led Western Test Theory to confine to the end result, one has to draw his attention to the theory which has provided the basis for the process of education in those systems. It is apparent that behaviourism provides the theoretical basis for Western Testing Systems. Thus by adopting western methods of testing we also have maintained behaviourist principles in our testing system.

Behaviourism appears to be the most wide spread and popular theory of learning in the 20th century. It has its origin as a protest against subjective idealistic psychology which was experimenting on psyche as a phenemenon of consciousness by using the method of introspective observations. Behaviourists believed that phenomenon psyche does not possess objective

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2. K. T. W. Sumanasuriya, *Administrative Report of the Commissioner of Examinations for the year* 1969—1970. (Colombo, Sri Lanka, 1978), (in Sinhala). p. 120.
3. *I. L. O. Report—Matching Empolyment Opportunities and Expectations in Sri Lanka.* (Geneva, 1971), p. 135.
4. *Interim Report of the Committee to inquire and Report on Public Examinations at the Secondary School Level in Ceylon.* (Colombo 1972). p. 10.
5. *Education: Proposals for Reform* (White Paper), (Colombo, 1981). p. 24.

traits and hence psyche cannot be used as an object for scientefic experiments. Therefore they rejected studying psyche and turned to study the behaviour of man. According to the behaviourist theory the most important is not that what a man thinks but what he does. Therefore learning theory which advocates behaviourism is mainly based on associative bonds between stimulus and response (S–R).

Behaviourists try to explain the learning process as an interaction between S.–R. and ignore the psychological process of learner which takes place between the stimulus and response. "While correctly emphasizing the role of student actions in instruction advocates of the behaviourist approach to the process of learning also limit the application of this principle to external responses alone. It is the sum of external responses rather than cognitive actions that constitute the content of instruction objectives. As a consequence the corresponding regulation programmes are directed at reinforcing the executive parts of actions which operate as the object of regulations, while the cognitive activities, which should be the objects of regulation, are generally unaffected.[6]

This model of learning has been spread to the sphere of testing and upto now the theory and practice of testing in the western and in some other countries are based on this behaviourist model. Vital characteristic of this learning model is the ignorance of congnitive activities. Absence of accounting for the central mental process in between S–R is seen in the the model of testing, constructed by behaviourism.[7]

Thinking process, which is the principal part of the process of learning is ignored by behaviourism. They draw attention only to the outward reaction and its correctness is regarded as the indicator of satisfactory learning. Question in a test is considered as the stimulus and choosing the correct answer out of few choices or filling the blank is taken as the response. As the behaviourists are not taking into consideration the cognitive process and only the stimulus and response are their concern, an important moment of this process does not come under their control. Behaviourists take no interest to explain whether the examinee got the answer by the blind method of "trial and error" or by engaging in optimum cognitive activities. Their theory does not explain how the examinee arrived at the final product of that cognitive activity. Their theory does not find an answer to this queston.[8,9]

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6. N. F. Talyzina, *The Psychology of Learning*, (Progress Publishers, Moscow, 1981), p. 313.
7. A. Michael, *Psychological and Pedagogical Basis for Control in Educational Process*, (Unpublished Ph. D. Dissertation, Faculty of Psychology, Moscow State University), (Moscow, 1978), p. 15, (In Russian).
8. P. Y. Galperin, *Formation of intellectual activities and concepts*,(Moscow,1965), p. 41, (In Russian).
9. N. F. Talyzina, *op. cit.*, p. 284.

L. J. Cronbach gives a good example which can be quoted to show the limitations of testing systems which account only the end result as the indicator of satisfctory cognitive activities. He explains how in an objective test (with multiple choices) in Japanese language, an American professor without knowing the language, but who was able to guess the structure of the construction of the test received the highest score. Though Cronbach states this incident to show another limitation of testing procedures, it sufficiently shows the weakness of accounting the end result as the indicator of the level of knowledge.[10]

Testing Theory which is subordinated to the behaviourist scheme has attempted to overcome the weakness of accounting for the end result as the indicator of the level of knowledge. For instance the procedure adopted for treating test scores as measures of the level of knowledge of students is one such attempt. For this purpose the following formula is frequently used.

$$K = R - \frac{W}{(a-1)}, \text{ where}$$

K = Corrected Score

R = Sum of correct answers received by the examinee

W = Sum of incorrect answers

a = Number of alternatives in an item

Cureton has observed the following features in connection with the above formula.

(1) In every question examinee may be in one of these situations: He knows the answer and marks it correctly ; he does not know the answer and marks the answer incorrectly or guesses the answer.

(2) Examinee has a "zero" knowledge regarding the problems he does not know.[11]

The given formula cannot be effectively used in situations where examinees guess the correct answer.[12] Let us consider the following two situations where this formula does not find any solution when an examinee guesses the answer correctly.

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10. L. J. Cronbach, *Essentials of Psychological Testing*., (Mc Graw Hill, New York, 1970).

11. E. E. Cureton, Measurement Theory. *In*: *Encyclopaedia of Educational Research* (4th ed.)/Ed. R. L. Ebel. (USA, 1960), p. 789.

12. P. E. Vernon, *The Measurement of Abilities*, (London, 1972), p. 173.

(1) Suppose that two examinees answer an objective type test which contains 100 items with two choices. Examinee A knew answers for 50 items which were correct and guessed answers for the remaining 50 items which were wrong. Similarly examinee B knew correct answers for 50 items and tried to guess answers for another 30 items which were incorrect. After correcting the scores of these two examinees for guessing, the corrected scores for them will be as follows :

$$\text{Examinee A : } 50 - \frac{50}{2-1} = 0$$

$$\text{Examinee B : } 50 - \frac{30}{2-1} = 20$$

What is the information provided by the above statistics about the two examinees? May be that examinee B is a slow thinker and could work out only 80 (50 correct and 30 incorrect) problems for the given period of time. If the assumption that B is a slow thinker is correct we can conclude that he has benefitted by his slowness in thinking, while examinee A is penalized for his high speed in answering.

(2) Let us assume that in a different situation in a same type of test, examinee A knew correct answers for 70 itmes and correctly guessed the answers for another 10 itmes for which he did not know the answers. Similarly examinee B knew correct answers for 70 items and guessed the answers for another 10 items which were wrong. According to the above formula the corrected scores for both examinees will be as follows :

$$\text{Examinee A : } 80 - \frac{0}{2-1} = 80$$

$$\text{Examinee B : } 70 - \frac{10}{2-0} = 60$$

If the number of correct answers is taken as the criterion for the level of the knowledge of the examinees we have to conclude that the level of the knowledge of examinee A is higher than that of examinee B in the given test which is really not correct. In our example it is clear that the level of knowledge of both examinees is equal as both of them knew correct answers for only 70 items. In this situation A is placed higher than B for his success in guessing answers correctly. (The practice of Test Theory is to consider that the level of knowledge which is expressed by test scores, always relates to the problems included in the given test. When the test changes the scores of the individual also change). In such situations statistical methods which are meant for the refinement of scores distort the real picture of the situtation.

This weakness of a behaviourist approach to learning and testing has been felt by many psychologists during the past few decades and as a result of this there have been many experimental attempts to overcome these weaknesses. There is an attempt to take into account the psychological process in between S—R in explaining the process of learning which might at the end be adopted to define the process of testing. Murray Glanzer has tried to form a learning theory which can be summarized as $S—R_1—R_2$, where S is the stimulus and R^1 and R^2 are first and second responses respectively. Glanzer explains this theory as follows. "Spence+ (1954) in an early report about the formation of this theory has explained differences among S—R theories, where reaction of the subject is the function of some stimulus or conditions, and $R_1—R_2$, theories where reaction of subject appears to be the function of some other different reaction of the subject"[13] Glanzer explains several approaches to study the process of learning as follows.

(1) Psychological theories whether $R_1—R_2$ or S—R express the specificity of their understanding the process of learning. These theories elaborate some series of psychological processes which transform the organism from one stage to another as an inherent characteristic of learning.

(2) Psychological theory should reveal the specific routine of the process that penetrates the internal nature of the individual. A theory which can be applied universally can be considered as an adequate theory.

(3) Theory should be able to explain the whole process of change that takes place in the individual.[14]

Though the theory of Glanzer appears to be a new theory it has not shown any significant deviation from the behaviourist theory. Glanzer himself writes that "S—R theories do not relate to specific objectives. Vividness of intermediate psychological processes can be examined as an amalgamation of S—R and $R_1—R_2$. With accordance to behaviourist construction for control of perception it is necessary to use combinations of theories $S—R_1$ R^{2},,[15]

+ K. W. Spence,"The nature of theory construction in contemporary psychology" *Psychological Review*, (USA, 1944), p. 47—68.

13. M. Glanzer, Individual Performance, R—R theory and perception. In: *Learning and Individual Differences*/Ed. R. M. Gagne. (USA, 1967), p. 146.

14. M. Glanzer, *ibid.*, p. 146.

15. M. Glanzer, *ibid.*, p. 147.

As it is obvious that limitations of learning theories that provide the theoretical basis for testing will account for the ineffectiveness of the marks obtained by using tests, there arises the need for a psychological theory which has potentialities to assess the mental process of examinees in between the stimulus and response. In such a theory testologists will find space for assessing the ability of students more meaningfully and effectively rather than standing on the end result of the performance of students. A testing system based on such a theory will fulfil its selective functions more satisfactorily and meaningfully, in a country like Sri Lanka where examination success has become the decisive factor on the future of the student.

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