ABSTRACT
                Technology education planners must evaluate, change, and
modify content to match rapid international advancements. Verification of
seen and unseen factors that would improve technology education output is
possible through periodic assessment of student learnability competence. The
ultimate tool in researching student learnability is the assessment
competency of the teacher. A topical outline has been suggested for a course
resulting in competence in learnability assessment. Possible objectives have
been developed. The content of such a course would include the required three
desirable attributes of educational and psychological measuring devices:
validity, reliability, and usability. Observations by teachers should get at
typical student behaviors in the affective domain. Assessment competency can
be completed either by formal testing with published and teacher-made tests
or by observing and scaling students' typical classroom behavior.
Recommendations for technology education planning through the intermediate
step of learnability assessment competence are: planning to meet objectives;
students' computerized academic behavior and fruitfulness of assessment;
assessment of immediate practical needs; straightening technology education
curriculum; required ongoing assessment; direct access to technology
education resources; and technology advancement and nonstop planning.
(Contains 23 references.) (YLB)

Abstract

Learnability Vs Assessment Competency as a Constitutive step for Planning improvement in Technology Education

Dr Saeed T. Al-Mallah   & Dr. Abdulaziz Al-Malik

Assessment Competency has been an ultimate tool in researching student academic attitude in Higher Education in general and very recently becomes as an effective technical requirement in planning improvement in *Technology Education.* Anne E. Edwards and Peter Knight London (1995); Brown S. and N. Peter (1994).
This overcomes the essential need for planning through the constructivism in *Technology Education.* ERIC Ref. 378.(1999-2000). Periodic assessment for instance in Colleges of Technology in Saudi Arabia based on student learnability reflects the above-mentioned competences required by higher education, industry and business like. This paper tempts to verify the seen and unseen factors of *Technology Education* output to facilitate assessment, remedy and modification processes to cope with the advancement of technology. Rudner, L.M. and Boston, C. *(1994,1998).* This would help us at the end investigate the link between planning improvement and situational circumstantial methods of increasing Learnability.(Winter,1993b) to give a better output in Technology Education Planning. (TEP).

1 2

Learnability vs assessment competency as a constitutive step for planning improvement in Technology Education

Dr. Saeed T. Al-Mallah   & Dr. Abdulaziz Al-Malik

Attention to competences in learnability and assessment linked to the need of the immediate users of the products of higher education *advantages* graduates who enter the job market. So training students to be able to analyze their rich experiences in order to identify competences relevant to specific fields may be ultimately more conductive to creating the autonomous, self-motivated learner required by higher education, industry and business like. Anne E. Edwards and Peter Knight London (1995); Brown S. and N. Peter (1994).

This research attempts to investigate the powerfulness of planning throughout the graph of student learnability in various times to understand the seen and unseen factors for *Technology Education* output in order to make it easy for planners to evaluate, change and modify the contents in a way that matches the rapid international advancement Rudner, L.M. and Boston, C. *(1994;1998)*. Newman, F. M. Marks, H. M. and Gamoran, R. *"Standards that Boost student Performance", (1995),* does help us in this regard to do more refinement, which directs the research to a new dimension to understand the relation between planning development and situational circumstantial methods of increasing learnability.(Winter,1993b).

The whole idea of the research is projected in the following chart.
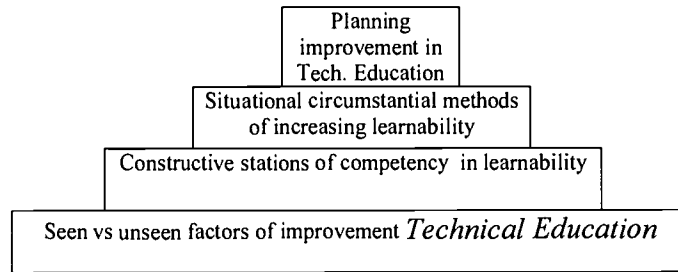
The four steps are to be carried out in a systematic sequence as per the following explanations:

1. Planning improvement in Tech. Education…using all the applicable devices that improve planning.
2. Situational circumstantial methods of increasing learnability…controlling all possible situations.
3. Constructive stations of competency in Learnability…including all positive forwarding steps in learning.
4. Seen vs unseen factors of improvement *Technical Education…deciding the harmony between them.*

- Why are we sometimes faced by less fruitful results out of our planning in *Technology Education* although, we always put more effort?
  If so, what is the shortest way to maintain the appropriate remedies?
- Teaching staff is the key factor to *planning improvement in Techno-Educational input*. If so, how can we turn him to be the machine for assessment competency?

The following is a designed suggestion for Learnability assessment competency, which is expected to improve *Technology Education* planning based on:

Educational and Psychological Measurement in
Technology Education Planning

TOPICAL OUTLINE
- ATTRIBUTES OF GOOD MEASUREMENT
1- *Validity*
   Content validity
   Predictive validity
2- *Reliability*
3- *Usability*
- MEASUREMENT IN THE TECHNICAL COGNITIVE DOMAIN
   Published tests in the cognitive domain
   1-Individual tests of intelligence
   Revised Stanford-Binet intelligence Scale
   Wechsler intelligence Scale for Student turn (WISC)

   2-Group tests of general intellectual ability
   And other aptitude tests

   3-Tests of educational achievement
   4-Tests of creativity
   5- Criterion-referenced achievement tests

   Teacher-developed procedures

   1-Teacher-made objective achievement tests
   Types of objective test items
   Guides for constructing objective test

   2-Essay tests
   3-Performance tests
   4-Ratings of work samples
   5-observation and rating of typical classroom activity

- MEASUREMENT IN THE PSYCHOMOTOR DOMIAN
   Published tests of psychomotor skills and physical fitness
   Teacher-developed procedures

- MEASUREMENT IN THE AFFECTIVE DOMIAN
  Teacher-developed procedures
    1-Questionnaires, check lists, and interviews
    2-Observation

POSSIBLE STUEDENT OBJECTIVE

Upon completing a course of study, appropriate sections of the student workbook, and discussion as necessary, teaching staff member should be able to:

1. a. Discriminate between measurement and evaluation and indicate the plate of measurement in evaluation.
b. Describe the need for measurement and evaluation in *Technical Education.*
c. Explain content validity, predictive validity, reliability and usability as
applied to educational and psychological measurement.

2. a. Give an example of each of the five categories of published tests in the cognitive domain and indicates a possible effective use and a possible misuse of each category of the tests.
b. State possible uses of each of five categories of teacher-developed assessment devices in the cognitive domain.
c. State some limitations of objectives achievement tests and essay tests in
 terms of content validity, reliability and usability, and describe procedures for
 overcoming the limitation.

3. a. Explain why much performance testing, rather than using paper-and-pencil tests, is done in the psychomotor domain.
b. Give examples of published tests and teacher-developed procedures in the psychomotor domain

4. a. Explain why there is decreasing use of published assessment devices in the affective domain.
b. Give examples of how students' attainment of objectives in the affective domain is measured.
c. Examine published tests and accompanying manuals to determine whether
the particular test has desired content validity and sufficiently high reliability
for teaching staff member purposes in using it.

Techno-Educational measurement is a tool concerned with ascertaining the quantity, extent, or degree of student learning, of teaching effectiveness, or some other facts of education. We can measure the student's level of achievement through administrating and scoring an achievement test. Also, we can count the errors in capitalization, spelling, punctuation, and sentence structure in a theme. Likewise, the number of exercise correct on an arithmetic assignment may be counted. These and other kinds of measurements are useful in subsequent evaluation in particular in Technology Education assessment e.g. in Colleges of Technology updated curriculum.

Evaluation in education is the process of judging whether the quantity or extent of something as measured is acceptable or desirable in terms of some criterion. Evaluation thus involves three-steps process of _securing_ information through measuring, _establishing_ criteria which to relate the measurement, and making a _judgment_ about the relationships. Evaluation stops short of indicating what action should be carried out on the basis of the evaluative judgment. For example, a student spells 7 of 10 words correctly. Ten of 10 words spelled correctly have been set as the criterion for proceeding further in a spelling program. The student hasn't reached the criterion. Now the teacher must decide what to do on the basis of the student's not meeting the criterion. Further information about the instructional program and the student may be needed to make wise decision. Although taking action is not a part of evaluation, teachers often make the decision regarding instructional matters and take actions based on decision.

Both measurement and evaluation pertaining student learning are required at three points in time:

1- Prior to the start of an instructional sequence so that an appropriate instructional program can be arranged for the students **(initial evaluation).**

2- During each sequence of instruction, measurement should facilitate the student's progress **(formative evaluation).**

3- At the end of a sequence to determine how well instructional objectives were met and to decide on appropriate courses of actions **(accumulative evaluation)**

In addition to evaluating student learning, the teacher also needs to evaluate the effectiveness of the instructional program for the particular student. Finally, the effectiveness of the school's educational program undoubtedly will improve from year to year if the school people probably evaluate it. The tests and other means of measurement in the cognitive, psychomotor and affective domains described may be used to secure information about student learning and the effectiveness of instructional programs.

ATTRIBUTES OF GOOD MEASUREMENT

The required three desirable attributes of educational and psychological measuring devices are validity, reliability and usability.

1. VALIDITY
Validity is a concept that relates the properties of a test to the _purpose_ of testing. A test may be valid for one purpose but not for another. Because only the test-user knows exactly what the purposes are, the burden of deciding whether or not a test is valid in a given situation ultimately rests with the test-user. Three of the main purposes of testing are to determine objectives that students are ready to attain, their

progress in attaining objectives, and the existent of attainment of objectives at the termination of an instructional sequence. Let us relate the purpose of tests to two types of validity with which teachers are concerned such as Colleges of Technology in this particular case.

Content validity

Content validity is concerned with how well the test gives samples from all the desired content-knowledge, skills, attitudes that should have been learned. Therefore, a content-valid test contains items that draw from each kind of content specified for the instructional program. Further, the items should reflect what received emphasis in the instructional program, that is, what the student had an opportunity to learn.

Predictive validity

Toward the end of a school year, teachers, parents and students are interested in deciding which courses the student will take the following year. Student counselors, for instance, may use test score as one kind of information to predict how well a student will perform if placed in a course, e.g., electronics, computer science, general mathematics or production and mechanics. Justification for using a test to select individuals for any particular course is provided if there is strong evidence that the test has high predictive validity. An example of such evidence is the data collected over the years on the same individuals-first their scores on the test itself and then their later performance in the course. If the test scores and achievement are highly correlated, then one is warranted in making predictions on the basis of scores on the test. We note that during any given year, the grades made by students, teacher judgments about the student and the student's expressed interest are useful in predicting the student's achievements the following year. Thus, they have predictive validity for this purpose.

2. Reliability

Reliability refers to the accuracy of a measurement. Why are accurate, consistent measures needed? Why are the teachers and commercial test developers so concerned about reliability? An inaccurate measurement does not give a true picture of present status and therefore has little or no predictive validity. For example, an *unreliable* reading readiness test administrated early in the first grade is of no value in describing students' present readiness or predicting students' later achievements in reading. It is not helpful in deciding whether a student will profit from beginning reading instructions or some time later (*such as testing new students reading a technical text.*) What conditions may result in low reliability of a test? The most important are as follows:

- A test may be unreliable because of poorly constructed items do not discriminate between students who possess the knowledge, skill, or other attributes being tested and those who do not. In this case a student who knows the particular subject matter may get the item wrong, whereas the one who does not know it gets the item correct. Stepien, W. J., and Gallagher, S. A. (April 1993): 2-28. (ERIC No. EJ 461 126)
- The length of a test also can be responsible for low reliability. Suppose 300 words in technical vocabulary have been taught during the year and a test is constructed to measure the students writing achievement. One single spelling word is a totally inadequate sample of a student's achievement. In a longer test of 50 items, we get more dependable scores-there is a better possibility that

variations accounted for by chance-guessing, carelessness, inattentiveness and other conditions will cancel out. A test can, however, be made so long that students become tired or bored and respond unreliably .

- Subjective scoring of tests and work sample may produce low reliability. For example, the teacher may be alert when reading one paper and tired when reading another. This may influence the scoring. In this case the scorer's judgements as represented in the rating or scores are not reliable.
- Inadequate time to complete a test lower reliability in any test where time is not a criterion of performance. This is a difficult problem to overcome, for the rate at which students respond to a test varies markedly. Nevertheless, if a testing session is stopped before some students are finished, the test is not a high reliability measure for those who did not complete it.

How to Overcome Low Reliability
Returning to the matter of low reliability that results from unreliable scoring, we note that carefully prepared criteria and instructions for scoring or rating may prove helpful. For instance, the *Handbook for Essay Tests, of Educational Progress,* suggests that students' essays be rated from 1 to 7, 7 being the highest rating (Sequential Tests of Educational Progress, 1957). Norms were based on an earlier scoring of essay in which readers scored on the basis of three factors:
 Quality of thought, 50 percent; *Style,* 30 percent; and *Conventions,* 20 percent.
The factors were defined as follows:
Quality of thought: means "the selection and the adequacy of ideas to the supplementary details, and the manner of their organization should reflect their coherence derived from the arrangement of parts. (e.g. they should reflect *Techno-educational input* if the test is held in Colleges of Technology)
Style: means "clearness, effectiveness, and appropriateness, including matters of structure diction, emphasis, the *means* of transition between ideas, and the finer points of simplicity, variety, and exactness of expression."
Conventions: means "the properties of mechanical form, including grammar and usage, capitalization, punctuation, and the mechanical aspects of the structure of sentences." A number of essays are then presented in the *Handbook* with rating and comments to guide the rater in making judgment. Eble, R.L.Criterion-referenced measurements.(1972).

3.   **Usability**
In addition to validity and reliability, a number of practical matters dealing with usability must be considered particularly when published tests are being widely distributed. Usability refers to these factors: (1) the amount of time required to administer the test; (2) the amount of preparation or education required to score the test; (3) the amount of time required to score the test; (4) the ease of interpreting the test results after the scores are obtained; (5) the cost; (6) the mechanical makeup of the test. Because of these considerations are quite important, test publishers usually provide such information in the test manual, along with the data on the reliability and validity of the test. The best source for much of this information is the *Mental Measurement Yearbook* series, prepared by Buros that has been published periodically since 1938. Often used in conjunction with *Tests* in *Print* and *Personality Tests* and

Reviews, the yearbooks include not only descriptive information about many published tests, but also critical reviews of the various tests and a bibliography of articles and book about each test.

Observation

Observations by teachers who are known to the students and who are performing in their usual role should get at typical behaviors in the affective domain. *The fact that the teacher has many opportunities for observing does not ensure that assessments will automatically be reliable.* Systematic procedures for observing and recording information are needed. Wilson, B., and Cole, P. 39, no. 4 (1991): 47-64. A few points about observing and recording that follow are necessary to *teaching staff member*. So what I could say him in this regard is that "To get valid *observations*, clarify what you wish to observe and then identify the behavior that pertains to it. For example, if you wish to deal with level of motivation, focus on the student's behavior dealing with initially attending to instructional activities and persisting until the activities are completed. This will improve the validity of your observations."

Reliability of the observations may be improved by recognising any favourable or unfavourable opinions you may have about particular students. Subjectivity, which leads to inaccuracies, may be identified by having another teacher observe and rate the same students at exactly the same time. In a team-teaching situation, for instance, at least two team members may rate each student; thus a more reliable judgement is obtained than if a single teacher rated each particular student.

Reliability may also be improved by counting and recording instances of specified behaviours. Jones, J. E. ; (Winter 1994): 23-25; (ERIC No. EJ 498 584)
The *incidence count* involves calculating the behaviours of interest as they occur throughout the school day.

- Check any of the following, which are, indicated as potential difficulties involved in measurement in the affective domain.
a. Invasion of privacy.
b. Low content validity of measurement tools.
c. Subjective evaluation of observed student behaviour.
d. Deceitfulness of student.
e. Incompetence of teachers.

- Check any of the following which may contribute to effective measurement in the affective domain.
a. Clearly stated objectives.
b. Holding student self-reports in confidence.
c. Counting incidences of specified behaviours.
d. Eliminating the use of questionnaires.
e. Avoiding use of the individual interview.

Validity of assessment competency vs redesigned planning

Assessment competency can be completed either by formal testing with published and teacher-made testing or by observing and scaling students typical classrooms behaviour. Pencil-and-paper tests should be supplemented by teacher observation and the collection of work samples so that both the optimum and typical achievements along with other characteristics of students are sampled. When constructing tests, we strive for (1) validity, to assure that the test items sample the content being taught and that the test score is useful in prediction; (2) reliability, to secure accurate measurements; and (3) usability, to assure that time, and effort are spent wisely.

Many tests have been standardized in such a way that any individual's score may be compared with the scores made by the standardization sample of students. These tests, which thus are norm referenced, are available to test abilities, achievements, and other characteristics of student in the cognitive domain. For example, the *Wechsler scales* and the Revised *Stanford-Binet Scale* are intelligence tests used to test one individual at a time. Other intelligence tests commonly used in the schools are administrated simultaneously to groups of students. Norm referenced, educational achievement in curriculum, areas such as (technical text readability), mathematics, or science. Criterion- referenced tests are constructed to measure the attainment of specific instructional objectives over short time periods. They may serve as pretests and also may be used in diagnosis, which offer a better chance of planning improvement or redesigning planning to overcome the deficiency caused by unseen factors.

Teaching Staff in Colleges of Technology and the designed Tests

Teacher-made tests, as other measuring devices, should have high reliability and content validity. The preparation of good tests requires careful thought in selecting the content and constructing the items. Similarly, the *securing and assessment* of work samples and observing typical classroom behaviors of students requires thoughtful consideration in order to facilitate student progress, in particular in teaching technology. Because teaching technology has got various trends recently, which are all controlled by appropriate assessment through well-designed tests or questionnaires

The Outcome of the research paper

Conclusive Results
&
Recommendations

1. Planning to meet the overall objectives

There are many different approaches to the definition of technology. There are however, no right or wrong definitions, but the workable definitions are the ones that are more or less useful. Braveman, H., (1974). The approach that one adopts to define anything depends on why one is studying it in the first place. We have to decide which approach to technology will be the most useful in helping us understand student behavior throughout assessment competency as the first step for planning. So simple and systematic job-analysis based on curriculum design has to be done every semester to compare the last achievement to the outcome of the newly introduced

material. It is one of the most relevant assessment practicalities to be considered to improve *Technical Education*.

2. Student's computerized academic behavior and fruitfulness of assessment

The best place to start computer based *Technology Education* where assessment is expected to be more helpful in educational planning, is the very beginning of enrollment where a student can easily state the difference between high school learning style and the university level style. It is where a student feels the difference, feels that he is in a different place, at a different stage and highly spirited by being accepted in a university College of Technology… It is this spirit that has to be invested learning wise aiming at a better Techno-educational input. The other reason is that the predefined category of studying technology esteems student to actualize a better academic performance.

3. Assessment of Immediate Practical Needs

Immediate Practical Needs (IPN) have to be assessed in order to harmonize the level of student to meet the standard of the assigned material to make him able to assist the practicalities of planning and not to fail it. This is not to change the material, but to adopt a better approach for student to adapt himself with the course required academic technical stuff. Harmony has to begin with resolving conflicts to diminish emerging difficulties that hinder setting of Techno-educational priorities and learnability afterwards. Proper priorities definitely help staff member understand the hierarchy of the material in relation to student capability within the course time span.

Succeeding to make assessment of immediate practical needs explains the link between proper assessment and achieving the easy fruitful follow-up, which achieve the following tow wings of appropriate planning at the end:

- A solid knowledge base for both teaching staff and student.
- Willingness to use imagination and creative thinking.

4. Straightening Technology Education curriculum

It is more than one mistake for a technology teaching staff member not to know how to develop or straighten the material given to teach. The type of development and straightening have to qualify student to be up to the standard required on the one hand and clarify the new advanced issues for the teaching staff member to see them in the best scope to master on the other hand.

5. Required Ongoing Assessment

If we have a look to the whole content of this paper, we will find out how far assessment is needed to have a central focus on Techno-educational planning through the full control over student learnability in steps. This would rather highlight the skeleton of planning in the wider scope. So what we are interested to end up with is the quality of assessment that leads to a refined planning for *Technology Education* in the decision-making bureau for Technology Education, represented for instance in General Organisation of Technical Education and Vocational Training. (GOTEVT) in Saudi Arabia.

6. Direct Access to Technology Education Resources

In order to have a better results of strategic planning, we have to have a direct access to technical educational resources that enables the management and teaching staff to carry on applying the curriculum without interruption. Continuity on what is planned would rather give a better chance to assessment competency rather than shifting from one idea to another to reform a plan.

7. Technology Advancement and nonstop Planning

By all means we cannot cope with the technological advancement in the same rhythm of inventor. But we do lots of trials in various aspects. We do our best whenever possible. So our trials should be based on assessment and planning with reference to both student and teaching staff capability to cope with expectations of higher education authorities for technology worldwide represented for instance in (GOTEVT) in Saudi Arabia, ERIC in US, VET authority in Germany, DTU in Denmark and all other similar boards.

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