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# Problem-Based Assessment: A Possible Approach to Practical Testing in the Field of Applied Linguistics

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**ABSTRACT**

The study investigated the possibility that there may be a mismatch between students' competency in solving real-life problems based on the subjects they study at university and their test results. In order to check the hypothesis, 46 M.A. students studying English Language Teaching were chosen in form of 3 intact classes. The researcher gauged the reliability and validity of the tests administered to the students. Next, the students were given a problem-based test which was based on real-life situations and in accordance with their course content. Moreover, the students' opinions towards the current testing system at their university were sought using a researcher-made questionnaire. The results of the study proved that the current test results at Payame Noor University (where the study was carried out) are neither reliable nor valid. Furthermore, it was proved that students' competency revealed through problem-based tests is way below the results they gain from the university tests. In addition, students' attitude toward the current testing system was not positive and they believed that the system should undergo a change.

**Key words:** Problem-based learning (PBL), Problem-based assessment, Test validity, Test reliability, English Language Teaching (ELT)

## INTRODUCTION

Assessment constitutes and important part of every educational system. That is why, educators have always been concerned with more reliable, valid and accurate test results which could really distinguish students deserving to pass a test and get a particular occupation in future from the incapable ones. The importance of this issue increases as the number of students in many educational systems is rising, and thus, the competition in order to get positions in different sectors of the society gets tougher.

On the other hand, the emphasis on preparing students to be able to solve real-life issues based on the subjects they pass at the university adds a new perspective to the issue of assessment. This significant perspective makes the process of testing more difficult. It means that not only should the tests be reliable and valid as should any test be, but also they should assess students' competency and problem-solving abilities in dealing with day to day life problems. For example, if a graduated language-teaching student with great results at the university cannot handle classroom problems and teach desirably later during her career, it can mostly question the assessment procedure of the university from which she has graduated.

### Background of the study

Issues such as students' ability to solve real-life problems brought educators at McMaster University in Canada in 1969 to the conclusion that a new problem-based approach to learning and assessment should be adopted by the educational department at medical school (Lee & Kwan, 1997, p.149). Practical premises of problem-based learning (PBL) and its profound psychological base in cognitive psychology (Norman & Schmidt, 1992) caused this approach to have been adopted by many educational systems worldwide since 1970 so much so that many countries such as Nigeria, Brazil, Switzerland, Malaysia and many others are now using this approach. Parallel to the application of PBL, investigations have been carried out to find out how successful this approach has been. One of the most recent ones, for example, was carried out by Virginie et al. (2015) to investigate PBL tutorship in medical and engineering programs in Malaysia claiming Malaysia to be the first county in Asia to take PBL, and PBL to have worked quite successfully there.

Savery (2006) defines Problem-based learning as "an instructional approach that has been used successfully for over 30 years and continues to gain acceptance in multiple disciplines" (p.9). In addition, Woods et al. (1996) defines PBL as an approach in which the problem drives the learning. In fact, a problem is given to the students to solve Instead of lecturing.

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Although in myriad papers a lot of attention has been paid to problem-based learning, much less attention has been paid to problem-based assessment (Savin-Baden & Major, 2004). Thus, the issue of problem-based learning was brought up by the researcher in this paper in order to define problem-based assessment in light of problem-based learning, since learning and assessment are not really two different separated entities and successful teaching without successful assessment is almost meaningless. According to the definitions given to PBL by different scholars, problem-based assessment should be a type of assessment that can assess students real-life problem-solving abilities in ill-defined situations presented to them (as daily problems are ill-defined and sometimes not in form of problems at all). An approach that assesses students' ability to decode a problem, analyzeit, generate ideas, apply ideas and come to a conclusion. The definition is derived from Hmelo-Silver (2004) steps in PBL. The steps are: (1) Problem scenario; (2) Identifying facts; (3) Generating hypothesis; (4) Identifying knowledge deficiencies; and (5) Applying new knowledge.

**Problem-based assessment and the context of Iran**

For several reasons Iran could be a context in urgent need of problem-based assessment. First of all, the tests administered by the universities seem to be based on students' ability to memorize the book content rather than to comprehend it. Secondly, the type of test administered by the universities in Iran has not undergone any significant change for a long time. Thirdly, a mismatch is felt by experts between students' scores and their competency. Hence, the researcher investigated English language teaching (ELT) students ability to solve real-life problems at M.A. level at Payame Noor University, as a sample of the student population at Iranian universities in order to see if the results gained from problem-based tests and university tests differ meaningfully.

**Assessment at Payame Noor University**

The assessment system at Payame Noor University has been the same since the institution of the university except for some minor changes in the type of multiple choice and essay type questions. On the other hand, there are no reports on validity and reliability of the test results at Payame Noor University. Besides, no study has yet delved into how practically the tests at Payame Noor University can distinguish students based on their problem-solving abilities.

Thus, the main purpose of the study is as follows:

1.To see if the test results administered to ELT students at PayameNoor University at M.A. level are valid and reliable;

2. To see if students' scores at problem-based tests are congruent with their scores gained from the achievement tests at Payame Noor University;

3. To delve into students' opinions about the testing system at PayameNoor University;

If it proves that the current test results at Payame Noor University are not valid and reliable, a remedial look at the tests should be taken. Besides if it proves that students' problem-solving abilities and scores at the university do not show sufficient correlation, it could seriously question the construct validity of the tests.

**Research questions:**

The answer to the following research questions was sought in the study:

1. Are the tests administered at Payame Noor University to ELT students at M.A. level reliable and valid?

2. Is there a meaningful difference between the scores gained by ELT students at M.A. level in problem-based tests and university achievement tests at Payame Noor University?

3. What do ELT students at M.A. level think about the testing system at Payame Noor University?

**Research Hypothesis**

The following hypotheses are to be tested in this study:

H01: The tests administered at Payame Noor University to ELT students at M.A. level are reliable and valid.

H02: Post-graduate ELT Students' scores gained from the problem-based tests and the university achievement test do not differ considerably meaningfully.

H3: ELT students at M.A. level at Payame Noor University have a positive attitude toward the testing system at Payame Noor University.

**Review of the literature**

PBL started as a reform in education in Canada in 1970's. Although it was used basically within medicine and business, it soon gained popularity in other academic disciplines such as biology and physics and to a lesser degree in history and geography (Larsson et al., 2001). The underlying assumption of PBL as stated by John Evans was "to stay away from the standard building-block structure, where a lot of content is shoved down the throats of the students, which they do not retain anyway and adopt a system where students are actively involved in the learning process" (Lee & Kwan, 1997, p. 149). There are some significant issues with regard to PBL. The first and probably the most important one is whether the learners in a PBL setting learn as much as learners in traditional instruction settings. According to Gallagher & Stepien (1992) Current research has demonstrated that children and young adult learners in PBL classrooms can learn at least as much as other students if the problems have been carefully constructed around the lesson content.

The second inquiry is whether the learners can learn discrete learning skills through PBL curriculum. Findings support PBL as a method of teaching many different kinds of skills including problem finding (Gallagher et al., 1992), rules of argumentation (Belland, 2010), experimental method (Feng et al., 2005), collaboration and peer tutoring and metacognition (Shamir et al., 2008). The strongest and most consistent finding in this branch of research is that students in PBL classrooms find learning more motivating, engaging, and satisfying (Hmelo-Silver, 2004).

Learners' experience in PBL leads to achievement as evidenced in structural equation models where student engagement contributes both directly and indirectly to achievement (Schmidt & Moust, 1995). At least part of this achievement seems to be the situational interest aroused by the problem itself. The problem engages the student, arouses interest, and the child learns as a result of being intrigued (Schmidt et al., 2011).

**Why PBL**

Application of PBL to different disciplines is not without reason. In general, it has been proved that the learners enjoy being actively involved in a learning process (Antepohl&Herzig, 1999). It means that the learners have active participation which can in turn reduce the pressure of intensive traditional teaching methods and help with the workload of the educational system. On the other hand, studies carried out on the performance of the learners educated in PBL classes' shows that they have better retention of knowledge, although they may not perform as good as other learners who took a traditional class in some tests such as multiple choice tests (Norman & Schmidt, 1992).

PBL tries to create a real life situation in which the learners are involved in a meaningful learning process. Unfortunately, memorization is a common occurrence in traditional programs which offers no solutions to the learners' real life problems. In addition, it is the learners who formulate the problem and generate ideas to solve the problem. Thus, the learners will have increased self-direction in terms of resources (Vernon & Blake, 1993), and they become better information seekers than traditional learners. Also, when problem are engaged, higher levels of comprehension and skill development occur (Albanese & Mitchell, 1993).

Furthermore, social interaction which is an inseparable component of language is fostered in collaborative group works carried out in PBL classes. Hence, the learners' interpersonal skills are improved (Bernstein et al., 1995; Vernon, 1995). Larsson (2001) in the article ' problem-based learning a possible approach to language education' posits that PBL accords with Blooms constructivist approach by aiming at enhancing learners' comprehension, questioning and critical thinking abilities, all of which are essential for language learning. He also mentions that language is a tool when learning not a subject of it. This fact reveals a difficulty with regard to PBL and language learning. Since for formulating a problem the learners need some raw facts which come through language. Now if language is to be formulated as a problem, the learners may lack raw facts to generate ideas and find solutions. Also, situating PBL into EFL or ESL settings is a very important issue. Abdullah & Hayati (1998) argue that "PBL can situate language learning by posing problems like those found in real life and which are relevant to the learners' situations." That is why, formulating problems in EFL/ESL setting are difficult. In fact, it requires a lot of artistry on the side of the instructor to guide the learners to obvious real situations.

Mathews-Aydinli (2000) argues that administrators need to fulfill a supportive role as initiators of PBL or by assisting the instructors who aim at using PBL in language learning classrooms. In fact PBL can seem to be costly in the eyes of the administrators as in lecture-based teaching the instructor as the lecturer can deal with a great number of learners at the same time since interactions are low and as long as there are seats more learners can attend the class. But PBL requires group work which means high amount of interaction and that is why one instructor cannot deal with many learners at the same time which means more instructors are going to be needed.

**PBL and Assessment**

Woods (2000, p.21) who used PBL in his Chemical Engineering courses at McMaster University in Canada, defined problem-based assessment as 'a judgment based on the degree to which the goals have been achieved based on measurable criteria and on pertinent evidence' .He contends that the definition can be best applied by breaking it down into five principles:

1. Assessment is a judgment based on performance – not personalities.

2. Assessment is a judgment based on evidence, not feelings. Whatever our intuition about a student's abilities, we need evidence.

3. Assessment should be done for a purpose with clearly defined performance conditions.

4. Assessment is a judgment done in the context of published goals, measurable criteria and pertinent, agreed-upon forms of evidence.

5. Assessment should be based on multidimensional evidence: static and dynamic situations; small assignments and lengthy projects; academic, social and personal contexts; under a variety of performance conditions; formative and summative data and with different persons being the assessors.

Following Woods definition of problem-based assessment Macdonald (2004) also encourages educators to think strategically about assessment in PBL by asking themselves the following questions:

Why are we assessing the students?

What are we assessing?

When are we going to assess?

Who is going to carry out the assessment?
How are we going to assess?
How are we going to grade/mark?
What feedback will students receive?

Segers & Dochy (1999) state that a set of principles are needed to make assessment congruent with PBL. The first, and probably the most important one, is that assessment should evaluate students competency with an instrument based on real life. Thus, the students should be confronted with problems from real life which gives them the opportunity to demonstrate their understanding of the influence of contextual factors and problem analysis as well as problem solving.

Macdonald & Savin-Baden (2004) list some forms of assessment that have been used successfully with problem-based Learning, and which also move away from the need to have outcome-based examinations. These assessment methods include: Group presentations; Individual presentations; Tripartite assessment; Case-based individual essays; Case-based care plans; Portfolios; Triple jump; Self-assessment; Peer assessment; Viva voce examinations; Reflective (online) journals; Reports; Patchwork texts; Examinations; Electronic assessment.

For sure, not all of these testing methods need to be adopted by particular educational system. Each system can see which type can best suit its students and the purpose of the course. For example, the University of Limburg at Maastricht has adopted PBL as its major teaching and learning approach. It has developed a university wide pattern of assessment with Progress Tests, once or twice a year across the whole of the curriculum and usually in multiple choice question format and Block Tests, after each of the four nine week blocks of the curriculum. Block tests combine a mixture of structured response questions to cases, multiple choice questions and free format essay questions. The same 'progress test' was used with students in all years of study.

The current study, as well, tries to shed light on students' competency with regard to problem-based assessment to see if Iranian universities could also adopt PBL and problem-based assessment.

### Participants

Forty-six students studying at the first and second year of the M.A. program in ELT at Payame Noor University constitute the participants for the study in 3 different intact classes. The table below shows participant's demographic data. As mentioned before, the participants were chosen in form of intact classes, since the tests are administered to all students at the university regardless of their English proficiency level and background.

Table 1. Participant's Demographic Data

| Gender | Number | Age | Level |
|---|---|---|---|
| Male | 11 | 24-37 | Post graduate |
| Female | 35 | 22-39 | Post graduate |

### Procedures

Three different multiple-choice type tests(psycholinguistics, contrastive analysis, and research) and one essay type test(practical teaching) were chosen as a source of data collection for this study along with the participants' opinions gathered through a researcher-made questionnaire and the results gained from the problem-based tests. The reason these particular subjects were chosen was: (1) The tests cover 4 different areas of the field; namely, linguistics, psycholinguistics, research, and teaching (2) The ultimate goal of the M.A. course is to prepare students to be English Language teachers in Future, thus, gaining competency in each of the fields in necessary and problem-based tests can work as a valid proof on students' readiness at the end of the course(3) Three of the tests are multiple-choice type and one is essay type( practical teaching); hence, the study covers two major test types used frequently in Iranian universities testing systems. In order to gain valid data for the analysis of the hypotheses, the researchers collected participants' scores on these four particular tests. The reliability of the tests was gauged using Crombach's alpha on SPSS for all the 30 items in each test. The practical teaching test, however, was essay type, and had 7 items. The participants were given 5 problem-based questions regarding the subject after each university test. 2 raters were asked to score the tests and Cohen Kappa was used to gauge the inter-rater reliability of the researcher-made tests administered to the participants. Later, the results of the university tests and researcher-made tests were compared using t-test.

### Data analysis

In the first phase of the study, the reliability of the tests administered by university for the subjects contrastive analysis, psycholinguistics, research, and practical teaching was gauged using Crombach's Alpha formula. The tables below reveals the results of the reliability tests for the aforementioned tests.

The table 2 clearly shows that the tests results for the subjects: contrastive analysis, research, practical teaching, and psycholinguistics do not have adequate reliability. Since Crombach alpha test results is way below the meaningful range for the tests to be reliable (close to 1).

Although the tests that are not reliable are not valid as well, the researcher calculated the construct validity of the test items using factor analysis. Each item of the tests was considered as a factor and the test results were used to see if

there is adequate correlation between the results. SPSS extracted thirty factors for the subjects contrastive analysis, psycholinguistics, research and seven factors for the subject practical teaching. Factor analysis results for each of the university tests was between 0.29 and 0.54; meaning that the factors considered in the analysis did not show enough correlation and that the tests validity hypothesis was rejected.

In the next phase of the study, Crombach's alpha formula was used again to check the reliability of the researcher-made tests. The table below shows the related reliability of the problem-based tests.

**Table 2. Reliability Statistics**

| Cronbach's Alpha | N of Items | |
|---|---|---|
| Contrastive analysis | .202 | 30 |
| Research | .194 | 30 |
| Practical teaching | .301 | 7 |
| Psycholinguistics | .257 | 30 |
| **Cronbach's Alpha** | **N of Items** | |
| Contrastive analysis | .754 | 5 |
| Research | .903 | 5 |
| Practical teaching | .803 | 5 |
| Psycholinguistics | .871 | 5 |

As can be seen in table 2, Crombach's alpha formula clearly proves that the test results gained from the problem-based tests are reliable. Validity of the problem-based tests was gauged using factor analysis. Factor analysis results for each of the problem-based tests (5 factors) ranged between 0.712 and 0.941; meaning that the results gained from the problem-based tests were valid. Next, the data gathered from the questionnaire was categorized. The reliability of the questionnaire was also gauged using Crombach's alpha. The reliability result for the questionnaire (Crombach alpha 0.89) proved that the questionnaire is a reliable one. Two items from the questionnaire were deleted as they proved not to be reliable. The results gained from the questionnaire are discussed in the next section. In the last phase of the analysis, the scores gained from the problem-based tests were compared with the scores gained from the university tests. The tables below show the results gained from the t-test.

As can be understood form the table 3, there is a meaningful difference (11.18) between the mean scores of the problem-based contrastive analysis test and contrastive analysis test administered by the university. The table 4 shows the results gained from t-test for psycholinguistic tests. There is a meaningful difference between the mean scores. The mean score for participants' scores in problem-based tests is 5.50 less than the scores gained from the university tests. The table 5 reveals the result of t-test for practical teaching tests, as can be seen, there is a meaningful difference between the results gained from the tests (Mean Difference=3.66). The table 6 depicts the results gained from the t-test for the problem-based research test and university research test. As can be seen, the participants' mean score from the problem-based test is less than the mean score from the university test by 2.10.

**Table 3. Independent Samples Test for Contrastive Analysis**

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference | |
| | | | | | | | | | Lower | Upper |
| Contrastive analysis | Equal variances assumed | .632 | .432 | 7.264 | 34 | .000 | 11.18889 | 1.54042 | 8.05837 | 14.31941 |
| | Equal variances not assumed | | | 7.264 | 29.152 | .000 | 11.18889 | 1.54042 | 8.03908 | 14.33870 |

**Table 4. Independent Samples Test for Psycholinguistics**

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference | |
| | | | | | | | | | Lower | Upper |
| Psycholinguistics | Equal variances assumed | 15.037 | .000 | 2.599 | 32 | .014 | 5.50000 | 2.11608 | 1.18969 | 9.81031 |
| | Equal variances not assumed | | | 2.599 | 21.087 | .017 | 5.50000 | 2.11608 | 1.10049 | 9.89951 |

Table 5. Independent Samples Test for practical teaching

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference | |
| | | | | | | | | | Lower | Upper |
| Practical teaching | Equal variances assumed | .871 | .360 | 1.370 | 24 | .183 | 3.66154 | 2.67246 | -1.85415 | 9.17723 |
| | Equal variances not assumed | | | 1.370 | 22.938 | .184 | 3.66154 | 2.67246 | -1.86769 | 9.19077 |

Table 6. Independent Samples Test for Research

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference | |
| | | | | | | | | | Lower | Upper |
| Research | Equal variances assumed | 9.129 | .005 | .905 | 32 | .372 | 2.11176 | 2.33235 | -2.63907 | 6.86260 |
| | Equal variances not assumed | | | .905 | 23.073 | .375 | 2.11176 | 2.33235 | -2.71222 | 6.93575 |

## CONCLUSION

One of the objectives of this study was to find out if the results gained from the tests administered at Payame Noor University are reliable and valid. The analysis of the data proved that the results gained from the current testing system at Payame Noor University are neither reliable nor valid. The data analysis also proved that participants' mean score on problem-based test was way lower than those gained from the university test; meaning that the university tests results are not representative of the students' degree of problem-solving abilities in terms of real life situations.

The result gained from the questionnaire revealed interesting facts about the students' opinions which were congruent with the results gained from the reliability and validity tests. For example, almost half of the participants taking each of the four tests believed that they forget most of the book within the next 2 weeks after the exam; contrary to the fact that around 70% of the students answering the questionnaire for each of the tests stated that they had studied the book two times or more before the exam. Almost 90% of the participants agreed that most of the book content is forgotten within the next two months after the exam. Such remarks by the participants can further prove that the results of the tests administered by the university do not have reliability. With regard to students opinion about the extent to which the tests check students competency, 65%, 60%, 75%, and 45% percent of the students believed that the test do not assess their competency on the subjects Psycholinguistics, , Practical Teaching, Contrastive Analysis, and Research respectively.

In addition, more than 85% percent of the students believe that the type of tests administered at Payame Noor university force them to memorize the book content rather than to comprehend it, albeit 80% percent of the students agreed that there is no point in memorizing date, facts and name of the authors, and 65% percent of the students preferred to analyze the question and answer the questions rather than to memorize them and get a score.

Other interesting facts gained through the questionnaire are as follows:

A total of 65% of the participants answering the questionnaire mentioned that they try to study the book within the last two weeks before the exam; probably because they forget what they had memorized if they started to study the book sooner. About 50% of the participants believe that the pass mark should not be limited to the final exam or the class mark and that more attention should be paid to students real problem-solving abilities. 90% of the participants believe that the university exams test students' memory rather than their comprehension.

Probably, problem-based assessment can be considered as a possible approach to test students' abilities to deal with real-life problems in their future career if we look at the ultimate purpose of the courses. For example, if the ultimate goal of the course 'research' is to prepare students to be able to conduct research, the course professor can ask students to conduct a study acceptable enough to get published in a journal, or if the ultimate goal of the course practical teaching is for the students to be able to teach appropriately, the professors could ask the students to teach in simulated classroom settings in front of their classmates to show their real teaching abilities.

In addition, just like any teaching and assessment system, problem-based testing requires problem-based teaching and learning. Checking students' competency through problem-based tests without teaching them how to solve real-life problems would not grow students' abilities to deal with real-life problems effectively. Therefore, it is suggested that curriculum designers consider this approach to teaching and assessment simultaneously.

## DISCUSSION

The findings of this study were also checked against features of new testing trends. Bound (1995) states that all assessment should lead to some kind of learning. Also,Ramsden (2003) believes that "examinations are frequently critiqued for encouraging memorization or surface approaches to learning." Forcing the students to memorize facts, dates, authors' names and quotations will definitely reduce comprehension and increase memorization in the students and cannot be considered as successful learning and assessment. The testing system and the types of question observed in this study proved to be over-reliant to memorization and, therefore, not reliable.Another important issue in recent assessment procedures such as problem-based assessment and learning-oriented assessment is centrality of students in the assessment process(2015, June 10th). Retrieved from http://wwww.tc.columbia.edu . In problem-based learning the students are supposed to define the problem based on the problem scenario and in learning oriented assessment, the feedback received from the students through formative assessment helps set learning tasks. Considering the assessment approach at Payame Noor University, the book content tells everything about the test not the students.

Another very important issue to consider is the accountability of the tests. Accountability as defined by Mousavi (2012, p.6) "refers to the demand of the community… for school officials to prove the money invested in education has led to measurable learning." the results from the problem-based tests revealed that M.A. students ability to solve real-life problems as a second language teachers such as being able to fix students errors desirably, being able to diagnose the source of a pronunciation mistake, assessing and scoring a written homework, etc. is lower than expected from a teacher.

The procedure taken in this study can be used to find out how well the educational systems are delivering education regardless of the disciplines and schools.Solving-real life issues can be set as a possible construct for many tests and the effect tests have on the learning procedure should also be underscored by researchers.

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