



# Perception and trends in assessment of students' learning in Physics courses

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## Abstract

The decline in education quality, as it is measured based on the objectives and goals it intended to achieve which are set by the experts and policy makers, becomes a global challenge. Among the many factors that influence the education quality, assessment technique usually takes the front line. This study investigates the teachers' perception and trends on different assessment techniques used to evaluate students' learning in physics courses. It also examines the students' perception towards different types of assessment techniques and assessment items. Systematic comparison of students' result scored for different assessment items in different assessments has also been employed to examine their achievement. In addition to administering systematically developed questionnaires which involves both students and teachers, a close and careful investigation of students' result scored for different courses has been done. Comparative, descriptive and quantitative methods have been used to present the obtained data. The study reveals that almost all physics teachers involved in this study are well aware of different assessment techniques and question types, however, only one or few types of assessment techniques and question types (mainly workout problems) are being used in most of the assessments in Physics courses. Most assessments in Physics courses are not in line with the pedagogical science principles and can only measure the lower thinking skill of Blooms' taxonomy structure. Negligence and lack of experience, to some extent, are believed to hamper the efficacy of assessment in improving education quality.

**Keywords:** Physics, Learning, Assessment, Perception, Blooms Taxonomy.

## Resumen

La disminución de la calidad de la educación, medida en función de los objetivos y metas que pretende alcanzar establecidos por los expertos y los responsables de la formulación de políticas, se convierte en un desafío mundial. Entre los muchos factores que influyen en la calidad de la educación, la técnica de evaluación generalmente toma la delantera. Este estudio investiga la percepción y las tendencias de los docentes sobre las diferentes técnicas de evaluación utilizadas para evaluar el aprendizaje de los estudiantes en los cursos de física. También examina la percepción de los estudiantes hacia diferentes tipos de técnicas de evaluación y elementos de evaluación. La comparación sistemática del resultado de los estudiantes calificados para diferentes ítems de evaluación en diferentes evaluaciones también se ha empleado para examinar su logro. Además de administrar cuestionarios sistemáticamente desarrollados que involucran tanto a estudiantes como a maestros, se ha realizado una investigación cuidadosa y detallada del resultado de los estudiantes para diferentes cursos. Se han utilizado métodos comparativos, descriptivos y cuantitativos para presentar los datos obtenidos. El estudio revela que casi todos los profesores de física involucrados en este estudio son conscientes de las diferentes técnicas de evaluación y tipos de preguntas, sin embargo, solo uno o pocos tipos de técnicas de evaluación y tipos de preguntas (principalmente problemas de entrenamiento) se utilizan en la mayoría de las evaluaciones. Cursos de física La mayoría de las evaluaciones en los cursos de Física no están en línea con los principios de la ciencia pedagógica y solo pueden medir la habilidad de pensamiento más bajo de la estructura taxonómica de Blooms. La negligencia y la falta de experiencia, hasta cierto punto, se cree que obstaculizan la eficacia de la evaluación para mejorar la calidad de la educación.

**Palabras clave:** Física, Aprendizaje, Evaluación, Percepción, Taxonomía de las Floraciones.

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## I. INTRODUCTION

The students' performance, learning and level of understanding over a given course usually measured through an activity assigned by the course instructor with the intention to assist and/or assess learning and to link

students' performance to specific learning outcomes; this activity is called assessment. For an effective instruction, presenting the course material to students by itself is not sufficient, since not all students have the same understanding level and equal learning pace which can be taken as a direct consequence of different learning

experience of each students since they usually came from different background. Learning usually demands an interplay between the teaching process and the outcome which can be observed mainly through assessment. When assessing learning, the instructor identifies specific goals and objectives for each course, systematically gauges the extent to which these anticipated outcomes actually occur and determines to what degree learning takes place [1, 2, 3].

Assessment basically delivers three benefits;

- A. Making the learning process more effective and consistent, which can be achieved by systematically linking assignments, course structure and grading practices to intended learning goals,
- B. Helping instructors to become better teachers by offering specific feedback on what is working or not working in their classrooms and
- C. Providing systematic feedback to students about their own progress.

Assessment required not only to evaluate the learner's achievement, but also the effectiveness of the instruction. The state of the art can be expressed in terms of what we know about how people is learning and how the learning process is taking place. Therefore, assessments are essential for the learning process. Finding a means of gathering information on the effectiveness of the instruction and a way to measure the students' understanding of the course content and its educational outcomes is essential for a course instructor [4, 5, 6]. Moreover, assessment provides students with feedback on their learning and can also be an incentive for improving academic performance provided that it handled in a sympathetic manner. Among many scholars, assessment is strongly believed to be capable of integrating the three central and most valuable elements of good practices in the teaching-learning process, namely active learning, regular feedback and student-teacher interaction [7]. Although it is an indispensable fact that teachers' subject matter knowledge is essential for effective learning and there are study reports revealing lack of conceptual knowledge among teachers' themselves is negatively affecting learning at every level of education [8], assessment plays almost equally important role in learning. However, lack of proper implementation of assessment severely hinders education quality, and hence some times termed as "Achilles heel" of quality in education institutions [9].

The most well-known form of assessment is a test or an exam. So, given the high stakes of evaluation, from a variety of perspectives, and the importance of accurately gauging and stimulating students' learning, it's imperative that you design valid, well-written tests and exams. In general, there should be some form of comparison between expected and observed outcomes, for which written examinations and oral examinations can be used [10]. Written examinations are determined to be quantitative measurement tools while oral examinations are known as qualitative tools [10, 11]. Written examination usually involves multiple choice questions, however, preparing

multiple choice questions has a challenge. The primary challenge in creating good multiple-choice questions is to have incorrect options (distractors) that match students' thinking [12, 13, 14]. Typically three to five distractors are offered, although there are exceptions.

In any instruction it is vital to start from setting some goals or expected outcomes. It might seem obvious, but one of the most important steps of test composition is to revisit your overall goals and objectives for the course and to determine which goals you intend to evaluate with this test, bearing in mind that a formal test or exam is not always the best way to evaluate the desired learning outcomes. Once you have identified which outcomes you want to measure, consider what type of question or prompt best facilitates the students' production of that outcome. For instance, is it your intention to create a test asking students to recall definitions or are you interested in having students demonstrate their ability to compare various concepts and defend their position on a controversial subject? Sometimes assessments are expected to be interactive giving the teacher a chance to identify what and how a student is capable of doing. However, some types of questions, like multiple choice, can lead to wrong perception on students' capability, since it allows them to guess from the available alternatives and the probability to guess the correct answer is much greater than zero [15, 16, 17]. Of course, it is possible to reduce the ability to guess the correct answer through increasing the number and resemblance of distractors in the question, but it is impossible to cause it to cease existence. Besides, different researches verify the lack of varieties in assessments at higher educational institutions, and even the assessment methods used by many teachers fall short of helping students learning [18].

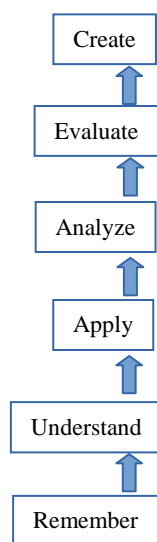
Education is a process that focuses at changing an individual's behavior. Some of the important aims of science education are to provide students with lasting learning of scientific concepts, and improve their thinking skills [19]. Planning, teaching, and assessment stages have been used in order to achieve these aims. Assessment is a crucial stage in determining whether students' conceptual development has reached higher order cognitive skills. Many people utilize Bloom's Taxonomy, a hierarchical structure of thinking skills, as a tool for gauging the cognitive depth of students' learning [20]. The Bloom's Taxonomy structure, which is shown in Figure 1, is helpful for constructing different types of tests that can be used to measure students' understanding level.

Our primary focus is to obtain the evidence about the type of questions (Workout, True/False, Fill in the blank, Matching item, Multiple choice or State/Explain/Discuss) and assessment techniques are being used for assessments in physics courses at young Universities in Ethiopia and to what extent these question types and assessment techniques are evaluating and contributing for the improvement of the students' cognitive skill. The results should be interpreted as encompassing all the activities undertaken by teachers and/or their students which provide information to be used as feedback to modify the teaching and learning activities in

which they are engaged. Both teachers' and students' opinion towards assessments in learning and types of questions appeared in assessments is also investigated since opinions, in addition to experiences, are believed to significantly affect, either positively or negatively, the practice of assessment in any educational institutions. Incorporating students' opinion is required to examine its relation with their achievement. Actually, students themselves, especially their attitude towards assessment, are oftenly claimed to be among the many factors that have impact on assessment process. Missconceptions on different types of assessment items may end up in narrowing the range of variety of assessment items. Which, consequently, may hinder the quality and reliability of the over all assessment practices. Besides, the same problem may negatively affect students' psychology and let them to have poor performance or to be less effective in assessments. Hence, it is valuable to figureout the common practices, attitudes towards assessment items and students' achievement through systematic investigation of openions and critical examination of students' achievement on different assessments. Therefore, this study is designed to adress these issues through systematic investigation of common practices in assessment and attitudes of both teachers and students towards different assessment techniques and question types that may appear in assessments of learning in Physics courses. Students' achievement in different types of questions has also been examined. This has been done by closely inspecting the students' result for the assessments given in the form of test and exam.

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Upper thinking skills



Lower thinking skills

**FIGURE 1.** Blooms' Taxonomy structure.

## II. MOTIVATION

Knowledge is not a matter of just receiving information and remembering it alone, but also about interpreting the information and relating it to one's own knowledge base. And hence the main target of assessment should be the learner's ability to organize, structure, and use information in context to solve complex problems. The need to improve the education quality, in terms of encouraging intellectual engagement and innovative knowledge, has been a major concern and one of the main topics of discussion among contemporary scholars, policy makers and the media for a long period of time and yet remain a hot issue. The power of assessment in improving education quality draws the

attention of most concerned bodies and took the front line in the list of areas for reforms. And hence the problem draws our attention and drive us to conduct this study to assess and analyze the trends and perspectives on assessments in physics courses focusing on young public Universities in Ethiopia.

### III. PURPOSE OF THE STUDY

The purpose of this study is to examine the variety of assessment techniques and question types frequently used in Physics courses at University level. It also aims to investigate, analyze and compare the perception and the real situation pertaining assessment techniques and question types in assessments. The specific objectives of the study are

- To examine and analyze the types of assessment techniques and assessment items used in Physics courses.
- To examine the trends and perceptions on assessments used to evaluate students' different types of skill.
- To investigate the impact of the existing assessment trends on the students' cognitive skill and on the education quality.

### IV. RESEARCH QUESTIONS

1. What are the most frequently used assessment techniques and assessment items in Physics courses in the young public Universities of Ethiopia? Why?
2. To what extent the assessment practices in these Universities are supporting and positively impacting the learning of Physics?
3. Is there any difference in perception among undergraduate students and Physics teachers in these Universities on the relative difficulty and appropriateness of question types that appear in assessments in Physics courses? To what extent these perceptions reflect the real situations in learning?
4. How wide the range of variety of assessment techniques and question types being used in assessing students' learning in Physics courses?

### V. MATERIAL AND METHODS

For this study students' results scored for exams and tests in three different courses given at different semesters are critically examined. The scores for three different types of questions in each assessments are also compared to study the students' achievement in different assessment items and to assess what type of skills and concepts might be missed by the students. Moreover, both open and close ended standardized questionnaires were administered. Both students and instructors are involved in filling the

questionnaires. Systematic comparison and descriptive (both qualitative and quantitative) methods were applied to present and discuss the obtained result. SPSS 16.01 and excel are the packages which are used to analyze the results.

### VI. STUDY AREA

The present study has been conducted in physics department at DDU, a public university which is established in 2007 and located at Dire-Dawa city administration in eastern Ethiopia. The department has three batches with a total of 160 students. Randomly selected second and third year physics students and all academic staffs of the Department are involved in this study. The authors believe this study area can well represent young public Universities in Ethiopia, since they are characterized by high level of uniformity, as it is witnessed from our practical experience, almost in all aspects of academic and administrative matters, though slight difference is possible which may only have negligible effect on the result of the study. And hence the result of the study can be smoothly generalized to all young public Universities in Ethiopia. Young University in this context represents a University which is established with in the past 15 years.

### VII. SAMPLE SIZE

In this study the systematic random sampling method has been employed. The sample size of the population should be designed to include a sufficient number of participants to adequately address the research question and to involve different types of respondents in the study. The sample size of population can be calculated using

$$n = \frac{Z^2 P(1-p)}{d^2}.$$

Where  $n$  is the sample size,  $P$  is estimate of the average rate of population ( $P = 0.5$ ),  $d$  is sample margin of sampling error tolerated ( $d = 0.025$ ),  $Z$  is the standard normal variables at 95% confidence interval ( $Z = 1.96$ ). Accordingly, the sample size of the population is 96.04. The total number of second and third year students in 2016 Academic year is around 90. And hence the sample population is set to incorporate 50 students and 9 teachers who are involving in teaching undergraduate Physics courses.

### VIII. RESULTS AND DISCUSSION

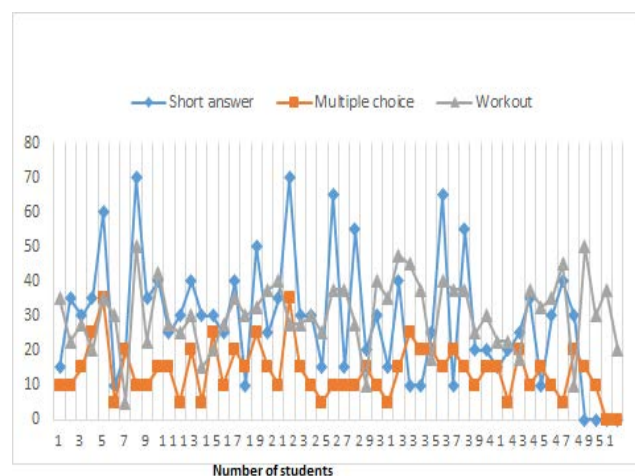
In this study the assessment results for three different courses, given in different semesters, are critically

examined. The study involves students of two batches, 2013/14 and 2014/15 academic year entry. The total number of students in the two batch is 90. All of them are undergraduate Physics students. About 88% of the respondents are male and the rest are female students. Gender imbalance is clearly seen here in the sampling. As a matter of fact only few female students are joining Physics department for higher education which is widely reported in different research outputs though the reason can vary from place to place since such cases are very specific to locations. In the sampling the authors try to make heterogeneous group according to the students' academic achievement, and hence the study involves all types of students, from low achievers up to high achievers. Since all of them are undergraduate students, they are in the same age level range between 20 and 25.

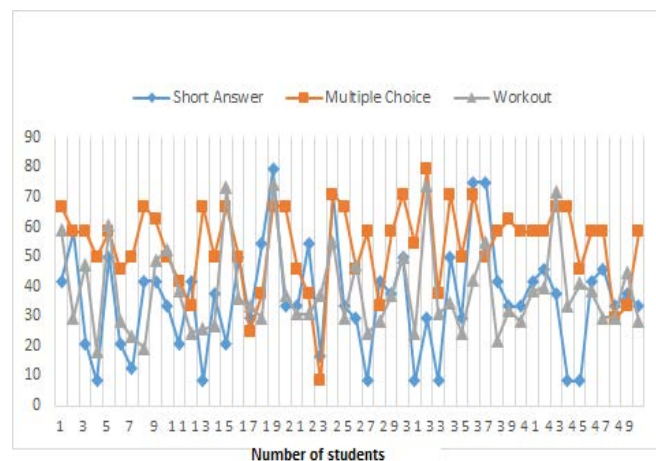
Now a days many Universities are giving special emphasis for continuous assessment. Most of them set strict rule which states at least 50% of the total assessment load should be continuous assessment, which means the total point of the final exam cannot exceed 50% of the total assessment load. In principle continuous assessment should include different assessment techniques like exercise, quiz, test, assignment (individual or group), presentation, project, etc. However, according to our observation, assignment and test comprise most or almost all part of the continuous assessment share in the total mark.

For this study we critically examine the tests and exam results of three courses. The exams, in general, contain three types of questions; multiple choice, short answer and workout questions. The distribution of results scored for each types of questions in all three courses considered in this study are summarized in the figures below (Fig. 2, Fig. 3 and Fig. 4). As it is clearly exhibited in Fig. 2, students perform very poor on multiple choice questions while they achieve better on short answer and workout questions. The main challenge in solving multiple choice type questions is identifying the appropriate answer from the available four or more distractors, provided that the questions are strong enough to measure students' cognitive skill. This can be done through providing a number of distractors that match students' thinking, which is the challenging task in preparing standard multiple choice questions. Their poor performance on multiple choice questions may indicate their poor conceptual understanding of the subject matter.

Fig. 3 and Fig. 4 however, exhibit comparable or approximately equal performance on all three types of questions. The average scores in course III, for example, are 48.07, 40.15 and 42.03 for short answer, multiple choice and workout problems respectively. Whereas for course II it is 35.92, 53.83 and 38.35 respectively. In the former course, the average score for multiple choice type questions is slightly less than that of other type of questions. In the later course however, the average score is higher for multiple choice type questions. The overall looking at the results indicates all the three types of equations considered in this study challenge the students almost at equal level.



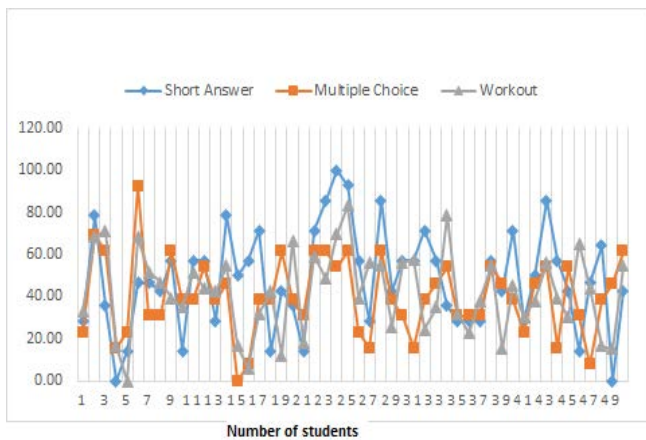
**FIGURE 2.** The distribution of students' result scored for three different types of questions in course I. It shows the percentage score obtained for each types of questions. It is clear from this figure that students perform better on short answer type questions and the worst result scored for multiple choice type questions which may imply they lack clear conceptual understanding of the subject matter.



**FIGURE 3.** The distribution of students' result scored for three different types of questions in course II. It shows the percentage score obtained for each types of questions. In this course comparable results are obtained for multiple choice and workout type questions, the results scored for short answer type questions is slightly lesser.

This is in contradiction to the perception of considering multiple choice questions as silly compared to other types of questions because of which most Physics exams don't involve this type and other similar types of questions. Most, if not all, Physics exams appear to have only workout problems. The basic principle behind this long last 'traditional' approach is the fact that any physics problem require analytical skill. The other reason for this is any question type other than workout and discuss/explain type questions are highly vulnerable for cheating, since students can easily copy the answers for these types of questions

from each other. According to the respondents addressed in this study, subjective questions (like workout or explain type questions) are the main tool to evaluate the students' understanding of the contents of Physics course. Not surprisingly both students and teachers share this idea, since more than 90% of the students and almost all teachers responds in favor of it. The authors too share the idea bearing in mind that both type of questions are less vulnerable to cheating and the solution demands good analytical skill, well understanding of the question and the scientific concept behind it and good memory provided that the questions were designed in that way. However, this are not the only skills students are expected to develop during the course period. For example, the skill used to compare different facts and principles, to identify closely related but different concepts which acquire deep conceptual understanding of the course content cannot be measured through the above mentioned techniques, rather it requires another different type of questions like multiple choice, True/False or fill in the blank. Skillfully written multiple choice items, for instance, can measure higher order level of cognitive skills (application, analysis, etc.) and can be administered efficiently to cover a wide range of course material. Though these types of questions are easy for cheating, this limitation can be reduced through different mechanisms that can be done before and during invigilation and it is being widely utilized in other courses like Biology or social science courses; nothing peculiar for physics courses to exclude these types of questions from list of assessment items.



**FIGURE 4.** The distribution of students' result scored for three different types of questions in course III. It shows the percentage score obtained for each types of questions. This figure exhibits all three types of questions are performed almost to the same level.

In addition to examining students' score for different assessments, systematically designed questionnaires were administered for both students and teachers. The questionnaires filled by students and teachers are slightly different and both involve open and close ended questions. The data collected through questionnaire involves 50

randomly selected students (25 from each batch) and 9 academic staffs of Physics department at DDU. About 76% of the student respondents are male while the rest are female. However, all the academic staffs who involve in this study are male, since the department has no female academic staff. All of them have at least second degree in Physics and also have more than 5 year experience in teaching.

The data collected through questionnaire to assess students' and teachers' perception on the relative difficulty of different types of questions that can appear in any tests and exams is summarized in Table 1 and Figure 5. The obtained result asserts that teachers and students are at different polarization in categorizing different question types according to their relative difficulty level. According to students', questions like explain/discuss type and workout problems are easier than other objective questions like multiple choice and short answer. Teachers, however, believe the reverse, accordingly explain/discuss and workout type problems are categorized as the most difficult type of questions and more appropriate to evaluate students' learning. Authors of this paper believe that it is this perception that should be responsible for workout problem takes the lion's share of assessment in Physics courses. It is indispensable fact that solving such type of physics problems demands much effort and good analytical skill, and hence it can serve as a good tool to assess students' ability of remembering some formulas and applying them to solve physics problems and also to evaluate their analytical skill. However, these are not the only skills students are expected to develop during their course of study. Rather, conceptual understanding might be the central and the most essential part of learning. As it is revealed by study [21, 22] it is common to notice students having difficulties in understanding Physics concepts, which usually ends up in misconception. It is unlikely to effectively evaluate such conceptual understandings using assessment tools that are assistive in evaluating analytical skill. Here it is worth mentioning that variety among students' background also may significantly impact the effectiveness of an assessment tool [23]. Therefore any standard assessment should incorporate variety of assessment items that are helpful to measure and develop students' cognitive skill and upper thinking skill as labeled on Groom's taxonomy structure.

Table 1 presents the details of the respondents' judgment on the relative difficulty level of the listed question types; each type of question categorized in one of three classes, easy, medium or difficult. The result is presented in percentage. The data for male and female respondents are computed separately and incorporated in this table just for the sake of assessing gender influence (if any) on the perception towards the question types. The overall picture of the result shows gender has insignificant influence on this research question. However, a close inspection of the table reveals some sort of gender based difference in categorizing these question types. For instance, Discuss/Explain type of question appeared to

challenge female students unlike to that of male students; for multiple choice questions, however, the reverse holds.

As it is clearly depicted in Table II, both students and teachers perceive assessments in Physics triumph all the four effects considered in this study as possible outcomes of an assessment; measuring students' memorizing skill, evaluating students understanding level, examining their ability to apply their knowledge and skill in science and motivate students to use reference materials, or in general positively impacting the teaching-learning. Especially third year students strongly support the content of the above statement. Though most of second year students too reflects in favor of this idea, there are significant number of students from this batch who stands against to it. According to these students, the assessments can achieve only one of the four objectives, identifying what students remember, while they have some reservation on the potential of the assessments to attain the rest three determinations. Similarly teachers show some sort of uncertainty whether the assessments are attaining all the intended objectives.

According to our observation and what this study reveals too, assessments in Physics at young Universities in Ethiopia are dominantly summative type, basically involves assignments and exams. Summative assessment is a kind of assessment usually used to evaluate learner's mastery of a topic or content of a material at the end of instruction. It measures the overall performance of a learner. It lacks assisting the learning process since it doesn't provide feedback to the learners on time so that they can work on their weakness and get improved in time. Only formative assessment has this quality and can provide the platform for improvement in education. Moreover, only few assessment techniques and assessment items frequently appear in those assessments. This implies assessments in Physics courses are suffering lack of variety in terms of both technique and items. Such narrow range of varieties for assessment capable of hindering the quality and reliability of assessment and, consequently, can negatively affect the quality of education. And hence the overall assessment process in Physics courses at young public Universities in Ethiopia needs much improvement in consult with pedagogical (or educational evaluation) principles. Previous studies reveals there is a significant loss in interest to study physics and students' performance in physics courses is devastating [24, and references in it). The type and way of assessments being used in education system would definitely has its own impact on the interest and performance of students. Thus any effort made on enhancing the standard of assessment can be considered as 'kicking two birds with a stone' since effective assessment can end up at boosting learner's interest and improving their performance.

## **IX. CONCLUSION**

We present results from a study that categorizes and analyze the type of questions and assessment techniques in

learning-evaluation repositories as part of the formative and/or summative assessment in Physics courses. The study reveals that, in general, there is a good practice of assessment at young Universities in Ethiopia. Most Physics instructors are well implementing the continuous assessment modalities as it is required by the national harmonized curriculum which is endorsed by the Federal Ministry of Education of Ethiopia. However, it is unlikely to conclude that formative assessment has being utilized very well. It is clearly known that formative evaluation is one of the main tools used to enhance education quality with its character of giving timely feedback to all stakeholders, especially students and teachers so that they can have a chance to improve their weakness and make the teaching-learning more interactive and effective. Thus, it is instructive to have good practice for effective implementation of formative evaluations in any course of learning. And hence, as it is revealed by this study, though the assessments in Physics courses at the young public Universities of Ethiopia involves continuous assessment to satisfactory level, it still demands much improvement to go in line with the current scientific outlook and principles on the main ingredients of educational assessment. Basically it lacks variety in assessment techniques and question types incorporated in tests/exams. The most widely applicable assessment techniques are assignment, tests and final exam. Even these assessments involve only one or two type of questions; dominantly workout problems. Any assessment which lack variety in kind, as it is mentioned above, has many drawbacks. To list some of them;

- It lacks the power to evaluate learner's higher thinking skill.
- It is unable to address all types of students; fast learners, medium learners and slow learners.
- Some students may have negative attitude for, or do not entertain, a given type of question or assessment technique. Such students may get discouraged.
- It may lack validity and reliability, since most of the time it is difficult to cover wide area of a material or course content with in few types of questions or assessment techniques.
- Unable to measure wide range of cognitive skills.

Therefore, it is instructive to stretch the range of varieties in question types and assessment techniques as much as possible so that our educational assessment becomes more scientific, standard and effective to achieve the intended target. Actually, at least in principle, there are possibilities to include several kinds of questions in a single exam to measure a range of cognitive skills. Similarly different types of assessment techniques can be applied in evaluating the effectiveness of the overall teaching-learning process. As it is verified in this study, most Physics teachers don't have critical problem with regard to knowing different assessment modalities, however, the implementation is not as such promising. This might be related with lack of motivation or experience on how and when to use which type of technique to assess whether a given course or topic objective is achieved or not. In addition to this wrong

perception regarding some question types and assessment techniques, lack of commitment to develop standard assessments that can challenge students, shortage of resources including Internet access, students' low performance, fearing for political interference and the like can be mentioned as possible causes for the existing poor evaluation system.

**FIGURE 5.** A bar chart showing the percentage of the respondents who categorize a given type of question as easy, medium or difficult relative to each other. In this chart only the total result, irrespective of gender of respondents, has been presented. It reveals students and teachers have contradicting perception on the relative difficulty level of different types of questions. Students believe workout problems and explain type questions are relatively easier, however, teachers perceive the opposite.

**TABLE I.** Percentage of the respondents who categorize a given type of question as easy, medium or difficult relatively. The responses from second year students, third year students and teachers presented separately for comparison purpose. The percentage for male and female respondents of each group has been computed separately and then the total percentage, irrespective of gender, is calculated. This might be subjective since the response could be based on personal experience and capability, however, it can serve being a good indicator of their perception.

| Assessments in Physics courses                                | Second year students |         |          | Third year students |         |          | Teachers |         |          |
|---|----------------------|---------|----------|---------------------|---------|----------|----------|---------|----------|
|   | Agree                | Neutral | Disagree | Agree               | Neutral | Disagree | Agree    | Neutral | Disagree |
| examine what students remember                                | 91.30                | 4.35    | 4.35     | 95.65               | 0.00    | 4.35     | 44.44    | 11.12   | 44.44    |
| examine what students understand                              | 52.17                | 4.35    | 43.48    | 91.30               | 8.70    | 0.00     | 88.89    | 0.00    | 11.11    |
| examine students' skill/ability to apply what has been learnt | 65.22                | 0.00    | 34.78    | 86.95               | 4.35    | 8.70     | 55.56    | 44.44   | 0.00     |
| encourage students to use reference materials                 | 60.87                | 4.35    | 34.78    | 86.96               | 0.00    | 13.40    | 44.44    | 22.22   | 33.33    |

**TABLE II.** Data showing the reflections about some of the effects of the assessments in Physics courses at DDU. This table presents the summary of the response from students and teachers for some of the questions related to the purpose of assessment. All results are presented in percent.

| Question Type       | Gender | Students    |        |           |            |        |           | Teachers |        |           |
|---------------------|--------|-------------|--------|-----------|------------|--------|-----------|----------|--------|-----------|
|                     |        | Second year |        |           | Third year |        |           | Easy     | Medium | Difficult |
|                     |        | Easy        | Medium | Difficult | Easy       | Medium | Difficult |          |        |           |
| Workout             | Male   | 72.22       | 0.00   | 27.78     | 23.53      | 11.76  | 64.71     | 22.22    | 0.00   | 77.78     |
|                     | Female | 60.00       | 0.00   | 40.00     | 83.33      | 0.00   | 16.67     | 0.00     | 0.00   | 0.00      |
|                     | Total  | 69.57       | 0.00   | 30.43     | 39.13      | 8.70   | 52.17     | 22.22    | 0.00   | 77.78     |
| Discuss/Explanation | Male   | 66.67       | 5.56   | 27.78     | 35.29      | 17.65  | 47.06     | 11.11    | 0.00   | 88.89     |
|                     | Female | 20.00       | 0.00   | 80.00     | 66.67      | 33.33  | 0.00      | 0.00     | 0.00   | 0.00      |
|                     | Total  | 56.52       | 4.35   | 39.13     | 43.48      | 21.74  | 34.78     | 11.11    | 0.00   | 88.89     |
| Fill in the blank   | Male   | 16.67       | 55.56  | 27.78     | 17.65      | 70.59  | 11.76     | 22.22    | 66.67  | 11.11     |
|                     | Female | 40.00       | 20.00  | 40.00     | 16.67      | 33.33  | 50.00     | 0.00     | 0.00   | 0.00      |
|                     | Total  | 21.74       | 47.83  | 30.43     | 17.39      | 60.87  | 21.74     | 22.22    | 66.67  | 11.11     |
| Matching            | Male   | 5.56        | 66.67  | 27.78     | 35.29      | 47.06  | 17.65     | 66.67    | 33.33  | 0.00      |
|                     | Female | 0.00        | 100.00 | 0.00      | 0.00       | 66.67  | 33.33     | 0.00     | 0.00   | 0.00      |
|                     | Total  | 4.35        | 73.91  | 21.74     | 26.09      | 52.17  | 21.74     | 66.67    | 33.33  | 0.00      |
| True/False          | Male   | 11.11       | 61.11  | 27.78     | 52.94      | 17.65  | 29.41     | 66.67    | 22.22  | 11.11     |
|                     | Female | 0.00        | 80.00  | 20.00     | 16.67      | 50.00  | 33.33     | 0.00     | 0.00   | 0.00      |
|                     | Total  | 8.70        | 65.22  | 26.09     | 43.48      | 26.09  | 30.43     | 66.67    | 22.22  | 11.11     |
| Multiple Choice     | Male   | 27.78       | 5.56   | 66.67     | 35.29      | 35.29  | 29.42     | 11.11    | 77.78  | 11.11     |
|                     | Female | 80.00       | 0.00   | 20.00     | 0.00       | 33.33  | 66.67     | 0.00     | 0.00   | 0.00      |
|                     | Total  | 39.13       | 4.35   | 56.52     | 26.09      | 34.78  | 39.13     | 11.11    | 77.78  | 11.11     |

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