Re-thinking of student skills to handling basic computer practice in junior high school

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Abstract. This study aimed to evaluate students' skills in basic computer practice in junior high school. We evaluated the student's skills to work with basics of Microsoft office software (Excel and Power Point) according to competency standards and school curriculum. The study involved 173 students who received the computer practice exam on March 2018. Data analysed using Rasch model approach. The results of this study showed that Microsoft Excel and Power Point practice exams are simply to be passed by 57 students. In general, the skills in setting up tables in Microsoft Excel have the highest difficulty level for students. Meanwhile, basic skill in locating information for Power Point objects is the easiest exam material for students. Unfortunately, although the quality as the exam material is good enough, but the material for computer practice exam is insufficient as to separate out the students' skills. Several measurement property assessments also presented to enrich the information from the findings of this study. A further implication from this research is that educators require to reconsider the test material led to students. In addition, it also takes into history the experience of students in operating the computer and perform computer exam procedures.

1. Introduction

Unlike in the former, since 2004 Information and Computer Technology (ICT)[1] studies have been officially established by the Indonesian government to be instructed in junior high schools. The objective is to develop students for the ultimate comprehensive development [2]. Previous studies have indicated that the learning of basics computers can be problematic and heavy for students [3]. Some aspect that influence the basic computer skills of learners can occur from the curriculum [4] and the capacity and skills of teachers who serve computer learning and practice. Positive views and beliefs of teachers on the suitability of computers that are handed out to learners can affect the happiness of basic computer use exercises for learners [5–7].

Computers are not merely dealt with as objects to be studied, but also as a design of special skills that students must have to deal with the global industry. Basic computer skills that are generally developed to students in the school that is in the work of Microsoft Word, Microsoft Excel, Microsoft PowerPoint, and operation of e-mail. Today’s, Microsoft PowerPoint and other visual technologies have become pervasive in schools [8], neither with Microsoft Excel [8]. Referring to the advances of working
it. Microsoft PowerPoint is suitable for being able to demonstrate multimedia significance programs [8], while Microsoft Excel is a prospective tool for data processing and/or software development [9].

Studies of technological developments, specifically computers that are so rapidly lately, frequently used for the development of learning media entirely. The teachers expressed that the need to complete the syllabi according to stipulated schedules so as to get the students ready for examination was the main barriers that prevented them from engaging in more constructivist teaching [10]. Unfortunately, very little documentation can be identified in the study of the quality of computer learning for students in schools and the evaluation of measurement properties. This becomes crucial considering, the learning cycle must arrive at the evaluation stage in order to establish, integrate and enhance the quality of learning in the classroom and cultivate social collaborative act [11,12].

Student examination means to measure the capability and essential skills of students in working with basic computer programs. The purpose of this research is to figure out students' skills in the use of Microsoft Excel, and Microsoft PowerPoint through computer practice exams. The measurement of the computer practice exam property provided by the teacher to the students has also been the material of investigation in this study.

2. Method

2.1. Participants
This research involved 173 students (mean age = 14.9 years old) class IX in junior high school. Criteria of students participated in this research, particularly students who picked up part in the primary computer practice exams. Furthermore, all student activities in this research is a credential. No credit received by students from the schools where the student performs for his/her presence in this research.

2.2. Procedures
Works are performed in a computer lab with a 1-unit computer for each student. First, Ms. Excel practice challenges the students to set up the table properly and followed by doing basic arithmetic (the sum and average function formula). Second, students are instructed to work used Ms. Power Point by making presentation slide theme “Healthy Foods” with the provisions of at least 2 slides. Students are offered the convenience to creativity in shaping the appearance of power point he/she created. Furthermore, students are assigned to express for power point material from the internet. Students are granted 30 minutes for each of the exam materials provided.

2.3. Measuring
This research data is extracted from the results of student’s computer practice test; conducted in March 2018. To measure of student’s skills, we used students practice rubric on polytomies shaped; that is very skilled = 5; skilled = 4; quite skilled = 3; less skilled = 2, and unskilled = 1, in completing basic computer practice material which provided.

The exam material is drawn up into 5 practice skills dwelling of (1) Skilfully on searching for information as a PPT materials, (2) Skilfully on created of PPT slide presentations, (3) Skilfully on designed the PPT presentation, (4) Skilfully on created tables in Microsoft excel, and (5) Skilfully used Excel formula for basic arithmetic on Microsoft Excel.

2.4. Data analysis
The results of the Microsoft Excel and Microsoft Power Point basic practice exams were analysed using Rasch Model [13–16]. More specifically, data processing and analysis using WINSTEPS version 3.73 computer program [17]. This research dataset can be accessed via osf.io/6yj7m Open Science Framework [18].
3. Result and discussions

3.1. Quality of computer practice test

Our initial investigation concentrated on evaluating the quality of computer practice exam materials arranged by teachers. It becomes essential to identify if the computer practice test is applicable and actually controls the students' skills or not. Estimates consist of, (1) reliability and separation index, (2) construct validity, and (3) fit and misfit exam materials.

Table 1. Summary of item measured based on Rasch fit statistics (N items = 5).

| Measure (1)              | Values | Measure (2)                | Values |
|-------------------------|--------|----------------------------|--------|
| Item Reliabilities      | .89    | Mean OUTFIT MNSQ           | 1.39   |
| Cronbach Alpha raw score "test" | .86    | Raw variance explained by measures | 30.3% |
| Separation Index        | 2.78   | Raw variance unexplained by measures | 69.7% |

Table 1 indicates the reliability of the computer's primary practice exam score (.89) and the reliability estimation of the interaction score between person and item (.86) is in a great level. Based on the separation index score (2.78), the practice exam handed over by the teacher to the students is adequate to separate the students' skills into three groups, which are extremely skilled, skilled, and skilled enough.

Unfortunately, in general the primary computer practice exam material is appropriate, and the test power provided for testing what is to be measured (unidimensional based on raw variance explained by measures) has been fulfilled (30.3%), but the quality is nevertheless in poor level <50%. Furthermore, there are two practice materials expressed by misfit or outlier, i.e. practice materials that have OUTFIT MNSQ value > 1.39.

![Bubble chart of practice test material.](image)

**Figure 1.** Bubble chart of practice test material.
The basic computer practice materials are (1) No. 4 = skillfully on created tables in Microsoft excel (OUTFIT MNSQ value = 1.46), and (2) No. 5 = skillfully used Excel formula for basic arithmetic (OUTFIT MNSQ Value = 1.43). Well, pointing out to figure 3 is recognized the outfit mean-square statistic (standardized residual chi-square divided by its degrees of freedom) is the red line. The infit mean-square statistic (ratio of observed to expected residual variance) is the blue line. This implies a misfit in person ability - item difficulty that can be generated by the pattern of disproportionate response due to carelessness of students in testing, cheating behavior, or guessing. This is absolutely detrimental to the students themselves and poorer the quality of the forecast measurement.

### 3.2. Student skills in the computer basic practice exam

Our second study is to evaluate the students' factual skills in taking the primary computer practice exams. Measures of primary computer skills for students are represented through (1) person reliabilities and separation index, (2) person fit and misfit, and (3) students with strong and inadequate skills.

| Measure (1)          | Values | Measure (2)          | Values               |
|----------------------|--------|----------------------|----------------------|
| Mean of Person Measures | .44    | Highest logit of Person | 3.04                |
| Person Reliabilities  | .52    | Lowest logit of Person  | -3.00               |
| Separation Index      | 1.03   | Maximum Measures      | 57 Students          |
| Mean OUTFIT MNSQ      | 1.89   | Minimum Measures      | 38 Students          |

Based on table 2 it is recognized that in principle all students have experiences in primary computer practice. This is signified from the value of Mean of Person Measures .44 > 0.00. Unfortunately, the stability of the answers provided to the object on the computer's primary practice exams is very weak (.52). This is also supported by the value of the separation index (1.03) where the disclosure of a student's skill performs only one group, or in other words the student's skill cannot be properly identified.
Furthermore, there are 57 students who have maximum measurement rate (+3.04 logit), that is students who have sense of basic computer practice skill is appropriate. In other words, the 57 students in question are very easy to pass the primary computer practice material investigated. Conversely, there are 38 students who have minimum values of measurement (-3.00 logit), i.e. students who have the lowest primary computer practice skills among other 173 students. Visualization of students' skills in computer practice as a whole can be looked at in figure 3.

**Table 3. Difficulty level of basic computer practice test material.**

| No. | Practice Test Materials                                      | Measure | Pt. Measure Corr. |
|-----|-------------------------------------------------------------|---------|-------------------|
| 1.  | Skilfully on searching for information as a PPT materials   | -.87    | .81               |
| 2.  | Skilfully on create of PPT slide presentations             | -.72    | .85               |
| 3.  | Skilfully on designed the PPT presentation                 | -.36    | .91               |
| 4.  | Skilfully on created tables in Microsoft excel             | 1.11    | .76               |
| 5.  | Skilfully used Excel formula for basic arithmetic          | .84     | .76               |

Mean=0.00, S. D= .82. Measure in Logit.

Based on table 3 it is noticed that practices that emphasize students' skills in working the excel formula for main arithmetic operations are the most complex practice materials for students (1.11 logit). Conversely, the skill in locating information as a power point material is the simplest practice material for students (-.87 logit).

Although the capacity of the students' skills can be measured and mapped properly, we get the fact that out of 173 students who pick up the primary computer practice exams there are students who are indicated to respond clumsily with the exam materials required. Misfit students, i.e. students with a value of OUTFIT MNSQ> 1.89, which included 12 students.

**Table 4. Students as person misfit (N Person = 12).**

| Students Code | OUTFIT MNSQ | Students Code | OUTFIT MNSQ | Students Code | OUTFIT MNSQ | Students Code | OUTFIT MNSQ |
|---------------|-------------|---------------|-------------|---------------|-------------|---------------|-------------|
| 068P          | 3.21        | 087P          | 2.60        | 090P          | 2.50        | 056L          | 2.47        |
| 069P          | 3.21        | 095L          | 2.60        | 130L          | 2.50        | 089P          | 2.47        |
| 170L          | 3.21        | 077P          | 2.50        | 164L          | 2.50        | 113L          | 2.47        |

Note: L=Laki-laki (Male), and P=Perempuan (Female). Data OUTFIT MNSQ in Logit.

Further misfit person analysis is completed by checking the arrangement of answers (Scalo gram) obtained from the test results. For illustration, we examined the 3-student Scalo gram in table 5.
Table 5. Guttman Scalo gram based on original responses (an example).

| Students | Item no +12354 |
|----------|---------------|
| 068P     | +44445        |
| 130L     | +44454        |
| 077P     | +44454        |

The order of practice items is from the easiest to the most difficulties. Relating to table 5, we know that 3 student’s misfits were identified to be able to perform the most difficult practice material but ignored to complete the easiest practice material. Furthermore, students 130L and 077P also contain misfits on suspicion of cheating behavior. This can be proved by the responses of the two students; where the expressed response pattern is the same.

4. Conclusions, limitation, and recommendation

4.1. Conclusions

All students have primary computer practice skills above average. However, students experience significant obstacles with the practice of setting up the tables and working with formulas in Microsoft Excel. Instead, students identify it simplest to locate information for power point materials linked to designing skills and generate power point slides.

4.2. Limitations and future recommendation

This study did not consider the experience of students in learning of the primaries computers in outside the school. Today’s, in global era, having a Laptop / PC at home is a familiar feature. Teachers should be prepared to arrange and maintain the altered portion of the exam for students who previously experienced and/or have a Laptop / PC at home. Teacher called for increases to the quality of exam materials handed over to students. This is because even though the exam material is reliable, but the construct validity of the exam material is nevertheless below the standard. Furthermore, there are 2 misfit indication practice exam materials, specific unproductive exam material to provide maximal measurement report.

The other side that needs to be addressed by the teacher, namely how to prepare students before the practice exams take place. This is significant because there are 12 students who misfit. The presence of student’s misfit signifies the carelessness of the students in the test; which can occur due to lack of precision of instruction from the teacher, so that students did not recognize the required practice instruction execution, and cheating behavior between students due to teacher negligence in supervising students during the exam.

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