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# Developing an Integrated Learning Assessment Model for Junior High School Students

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**Abstract: Developing an integrated learning assessment model for junior high school students.** **Objective:** This study aims to produce a valid and practical assessment model for integrated learning at the junior high school level. **Methods:** This research is development research. Research respondents came from 6 junior high schools in Surabaya with a total of 211 students. The instruments used are validation sheets, observation sheets, and questionnaires. **Findings:** The results showed that (1) the developed assessment model and instrument were in the valid category, both in construction and in substance; (2) Practical, appropriate and able to be applied in integrated learning in junior high schools; (3) The test results show that the competence of knowledge-understanding and application is relatively high. **Conclusion:** The developed assessment models and instruments are feasible to be applied in integrated learning and are found to be more interesting, fun, and useful for junior high school students.

**Keywords:** Developing, assessment model, integrated learning, junior high school.

***Abstrak: Mengembangkan model penilaian pembelajaran terpadu siswa SMP.*** ***Tujuan:*** *Penelitian ini bertujuan menghasilkan model penilaian yang valid dan praktis untuk pembelajaran terpadu pada jenjang SMP.* ***Metode:*** *Penelitian ini merupakan penelitian pengembangan. Responden penelitian berasal dari 6 SMP di Surabaya dengan total sebanyak 211 siswa. Instrumen yang digunakan berupa lembar validasi, lembar observasi, dan kuisioner.* ***Temuan:*** *Hasil penelitian menunjukkan bahwa (1) Model dan instrumen penilaian yang dikembangkan berada pada kategori valid, baik konstruksi maupun substansi; (2) Praktis, sudah sesuai dan mampu diterapkan dalam pembelajaran terpadu di SMP; (3) Hasil pengujian menunjukkan kompetensi pengetahuan-pemahaman dan penerapan relatif tinggi.* ***Kesimpulan:*** *Model dan instrumen penilaian yang dikembangkan layak untuk diterapkan dalam pembelajaran terpadu serta dirasakan lebih menarik, menyenangkan, dan bermanfaat bagi siswa SMP.*

***Kata kunci:*** *Pengembangan, model penilaian, pembelajaran terpadu, SMP.*

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## INTRODUCTION

The evaluation or assessment process is one of the teacher's tasks that will determine the direction of further learning activities. Every educational organization carries out a program starting from the planning stage to the evaluation stage (S. Indana et al., 2021). Assessment is an activity of collecting, interpreting, and describing information about a certain person or institution, both qualitative and quantitative. That data collecting activity is done by several measurement activities (James et al., 2022; Goss, 2022; Sanjaya et al., 2022; Arruda & Silva, 2021; Searle et al., 2021; Toma et al., 2021; Tractenberg, 2021; DeLuca et al., 2021; Fitzgerald et al., 2021; Zhai, 2021; Piragasam et al., 2021; Stratigos & Fenech, 2021; Hairun, 2020). Student assessment activities are an important component and are integrated with teaching and learning activities in schools. An accurate assessment is not only collecting more information but the information also firms to give inference (Sifak Indana et al., 2020). Planning of good assessment will measure and collect information of learning results comprehensively (Brown, 2019; Schellekens et al., 2021). As the learning technique shifting, from teacher-centered learning to student-centered, the assessment approach is also shifted for not only on assessment of learning, but also assessment for learning and on assessment as learning. Routman (1996) and Marsters & Forster (2008) stated that in various learning results, there is no certain action, strategy, activity, or personal task describing personal skills completely. Every single learning result needs an assessment method as its characteristic, that is why various methods must be applied (Jiménez-García et al., 2020; Lara et al., 2020).

In the 2013 Curriculum, at the junior high school level, science learning is developed as an integrative science subject that has the meaning of combining various fields of scientific study so it is called integrated science learning. The field of scientific study which consists of physics, chemistry, and biology is carried out as a whole, into a single unit and no longer separated (Atmojo, 2018; Oktavia, 2019; Setiawan, 2019). The integrated learning system is an alternative to the usual disciplinary learning model, examining one theme in particular, separate and esoteric (Boimau & Mellu, 2019; Kahar et al., 2022). By integrated learning approach, one of the subjects is used as the host and the other relevant subjects are combined. For example, in an integrated natural science subject, biology explains about life becomes host, while physics, chemistry, and geology are integrated into biology. Direct experience in learning can be obtained through integrated science. Students can also increase the strength to receive, store, and apply the concepts they have learned so that they can find their various concepts studied in a holistic, active, authentic, and meaningful. (Dewi et al., 2019; Hidaayatullaah et al., 2021; Nugroho et al., 2021).

According to Gronlund (2003), assessment can be done traditionally (by paper and pencils test) and real-life-based authentic assessment. In the context of thematic and integrated learning, knowledge assessment instruments can be assembled involving various substances, task stimulus or question can be assembled authentically by involving real phenomena, then question set can be still assembled unidimensional as the competence measured. In the skills assessment, an assessment model that can measure various skills in the 21$^{st}$ century needs to be assembled. Skills in the 21$^{st}$ century are known as 4Cs (critical, creative, collaboration, and communication) (Afandi et al., 2019; Zulkarnain et al., 2021). One of the learning models that can be used for training the 21$^{st}$ century is the project-based learning model (Ansori et al., 2019; Penelitian et al., 2021; Wibowo & Ariyatun, 2020). Project-based

learning is a systematic learning model, involving students in complex real-life tasks that produce a product or presentation to the audience, allowing students to obtain knowledge and skills (Chen & Yang, 2019). Assessment of learning outcomes must also meet the principles of (1) Meaningfulness, (2) Explicitness, (3) Fairness. Fair does not mean that every student gets the same value, but that the score should be obtained according to the learning ability of each student, and fulfills the criteria of validity and reliability (Herawati et al., 2020; Usman et al., 2021; Wahyuni et al., 2021).

The facts in the field often occur that learning has been designed in such a way, but has not been followed by an appropriate assessment system. Research conducted by Amarila (2014) said that the teacher only conveys the concept of science, causing students to be less trained to develop their reasoning power in applying the concepts they have learned. In addition, the aspect of students' thinking skills has not been considered in detail because the existing evaluation tools have not been able to measure students' thinking skills in Integrated Science learning in schools. Trimawati (2020) also stated that students have difficulty in developing critical and creative thinking skills, they tend to be passive and always depend on what is taught by the teacher. Another problem is that the integration of the field of science studies has not yet emerged in learning, when teachers make evaluations of daily assessments and end-of-semester assessments, the items do not refer to the integration of science, teachers also still useless innovative learning models, some even use teaching methods by summarizing, so that the material obtained by students is not closely embedded in long-term memory, critical and creative thinking that students have is less trained and affects academic achievement (Elfrida et al., 2021; Hasanatin & Rohaeti, 2021; Prahani et al., 2019; Trimawati et al., 2020; Wahyuni et al., 2021).

Whereas assessment activities cannot be separated from learning activities. Existing assessments such as summative assessments based on paper and pencil tests are no longer the main reference for measuring student learning achievement. Partial assessments, especially those that are only dominant in the cognitive domain, also cannot provide information on the complete picture of competency achievement. Therefore, the purpose of this research is to develop a valid and practical assessment model to be applied in integrated science learning at the junior high school level. The urgency of this research is expected to provide benefits to education, in particular, it can be a model for assessing the realm of new knowledge, especially for thematic and integrated learning, with characteristics: cross-map, contextual, using multi-representation, integrated but still unidimensional. And can strengthen project assessment in thematic and integrated learning.

## METHODS

### Research Design

This research is development research, by adopting and modifying the research design of Fenrich (2004). The stages of development are shown in Figure 1. The product developed in this research is an integrated learning research model for junior high school students.

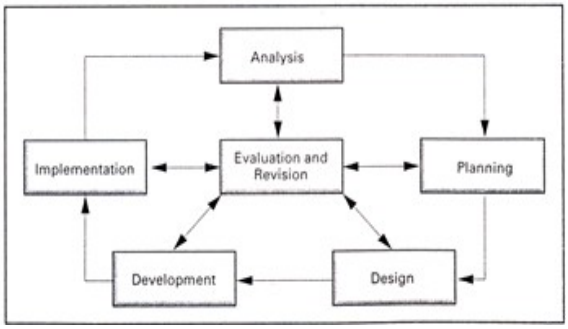


**Figure 1**. Instructional development cycle model Fenrich

**Table 1.** Research respondents at the junior high school level

| Group | School | Respondents (students) |
|---|---|---|
| Upper | State Junior High School 1 | 35 |
| | State Junior High School 3 | 38 |
| Middle | State Junior High School 16 | 33 |
| | State Junior High School 42 | 34 |
| Lower | State Junior High School 45 | 34 |
| | State Junior High School 49 | 37 |
| | Total | 211 |

**Participants**

The research was conducted in Junior High School. The population in this research were students at the junior high school level in the city of Surabaya and its surroundings who had implemented integrated learning. The research sample was 211 students representing 3 groups, namely the lower, middle, and upper groups based on accreditation or the average value of national exam or computer-based national exam and had implemented integrated learning. Table 1 presents the grouping of respondents at the junior high school level.

**Procedure**

The research on the integrated learning assessment model for junior high school students outlines the stages and targets of this research are presented in Table 2.

**Instrument**

The research instruments used were validation sheets, observation sheets, and questionnaires. The validation sheet is filled out by the assessment expert and material expert to justify the validity of the assessment model and instrument developed through a focused

**Table 2.** Research step and target

| No | Step | Target |
|---|---|---|
| 1 | Identifying school, theme, and teacher's obstacle. | • Three junior high schools for research respondents.<br>• Several themes in thematic and integrated learning were agreed upon.<br>• Several obstacles felt by teachers in assessment activity were identified. |
| 2 | Identifying basic competence and its achievement indicator as to the base of arranging assessment instrument. | • The result of indicator identification was suitable to the previous deal. |
| 3 | Assembling assessment instrument and research instrument. | • Negotiated instrument format of knowledge and performance assessment.<br>• Negotiated aspects of research instrument: validation, observation, and questionnaire sheet. |

| | | |
|---|---|---|
| 4 | Developing assessment instruments and research instruments. | • Draft of knowledge and performance assessment instruments were produced.<br>• Validation and observation instruments were produced.<br>• A focused Group Discussion was done.<br>• Finalization of knowledge and performance assessment instrument. |
| 5 | Testing and analysis of testing. | • Observed thematic learning and associated learning in school.<br>• Implement developed assessment instrument.<br>• Analyzed testing results. |
| 6 | Making report. | • Writing a final research report |

discussion mechanism or FGD (Focused Group Discussion). The observation sheet is filled out by observers, consisting of practitioners and researchers to determine the practicality of the developed assessment model. While the questionnaire was filled out by students and teachers to find out their responses.

### Data Analysis

The data collected were analyzed following the stages of Cresswell (2014), generally covering: organizing and preparing the data; reading data information; data encoding; classifying data codes according to certain criteria; presenting the classification of data in the form of quantitative percentages or visuals in the form of tables, graphs, or pictures; perform analysis; and formulate findings.

## ■ RESULT AND DISCUSSIONS

Formative evaluation by experts and practitioners was done by *focused-group discussion* (FGD), by summoning assessment experts from several University, experienced staff from the Center of Educational Assessment, and headmasters. FGD members validated the assessment instrument using the validation sheet that the result was presented in Table 3.

**Table 3.** FGD participant assessment result

| No | Assessed Aspect | Assessment | | | | |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 |
| **A.** | **Assessment Model** | | | | | |
| 1 | Assessment model and its lesson compatibility. | | 10.5 | 26.3 | 31.6 | 31.6 |
| 2 | Meaningfulness of assessment results for students. | | | 9.5 | 33.3 | 57.1 |
| 3 | Measuring high order thinking skills | | 9.1 | 18.2 | 40.9 | 31.8 |
| 4 | Feasibility | | 18.2 | 4.5 | 45.5 | 31.8 |
| **B.** | **Assessment Instrument** | | | | | |
| 1 | Compatibility of indicator to the main competence. | | | 14.3 | 47.6 | 38.1 |
| 2 | Compatibility of the instrument to indicator. | | 4.5 | 36.4 | 31.8 | 27.3 |
| 3 | Construction of assessment instrument. | | 4.5 | 36.4 | 45.5 | 13.6 |
| 4 | Readability of instrument. | | 9.5 | 19.0 | 47.6 | 23.8 |

Table 3 showed that more than 50% of FGD members gave scores on ranges 4-5 for all assessment aspects. It means that most of the FGD members assessed that assessment model and its developed instrument was in the 'good' and 'very good' categories. Even 90% of FGD members assessed that the developed assessment model was meaningful for students. Comment from Experts in FGD included the instruments used by environmental conditions and environmental health, the language used was easy to understand, the stimulus and questions could encourage students to think and be useful for everyday life. In addition, there are comments from experts that aim to improve the instrument, including the instrument needs to be expanded across subjects (science, culinary arts, and sports), can be integrated with character education strengthening programs and school literacy programs, too much reading in the draft so that students experience boredom In reading, it is more suitable to be given as an assignment so that students can explore more broadly, questions can be made more systematic, and it is necessary to add scoring guidelines. All suggestions from experts are then used as the basis for making revisions. Teachers towards developed assessment model and instrument also did validation. The validation result was presented in Table 4.

**Table 4.** Assessment from teachers to developed assessment model and instrument

| Component | Agree/Good (%) | Very Agree/Very Good (%) |
|---|---|---|
| **Assessment model** | | |
| 1. Assessment model and its lesson compatibility. | 60 | 40 |
| 2. Meaningfulness of assessment results for students. | 60 | 40 |
| 3. Measuring high order thinking skills | 80 | 20 |
| 4. Feasibility | 60 | 40 |
| **Assessment instrument** | | |
| 1. Compatibility of indicator to the main competence. | 40 | 60 |
| 2. Compatibility of the instrument to indicator. | 60 | 40 |
| 3. Construction of assessment instrument. | 60 | 40 |
| 4. Readability of instrument. | 20 | 80 |

Assessment from a teacher before ensured that developed assessment model and instrument was in good and very good condition. Implementation was done by testing developed assessment instruments in the schools. This research did not need intervention on the learning process. The learning process took place naturally as assembled on lesson plans by teachers in the school. The researcher made sure that thematic lesson and integrated lesson happened as written in a lesson plan. Then, the researcher gave an assessment instrument to be responded to by students; students were given a lesson plan to obtain their responses.

**Table 5.** Recapitulation of responses from junior high school students

| No | Statement | Disagree | Don't know/ answer | Agree |
|---|---|---|---|---|
| **1** | The question was interesting because of its relationship with phenomena or daily occasions. | 0.09 | 0.10 | 0.81 |
| **2** | The question was fun because of contained several materials that became one, as in the lesson. | 0.14 | 0.09 | 0.77 |
| **3** | The question became more beneficial for me because of the contained daily phenomena. | 0.04 | 0.06 | 0.90 |
| **4** | There was a difficult word or I couldn't understand. | 0.34 | 0.15 | 0.51 |
| **5** | The question became more difficult because the question contained integrated material: biology, physics, and chemistry. | 0.37 | 0.16 | 0.46 |

Recapitulation of junior high school students' responses to the assessment model and instrument were presented in Table 5.

According to Table 5, more than 75% of junior high school students stated that the developed assessment instrument was interesting, fun, and more meaningful. Between 40-50% of junior high school students assessed assessment instruments that integrated several subjects became more difficult. This difficulty came from several vocabularies, which were hard to understand. Integrated learning assessment instrument that was developed had relation basic competence of 3.5: analyze digestive system on human, understand digestive system disorder, and ways to keep the digestive system healthy; and basic competence of 3.6: explain various additive in the food and drinks, addictive material, and the effect for health.

The graphic in Figure 2 showed several important things. In junior high school students' competence, the highest one was knowledge-comprehension and the lowest one was interpretation. These results enhanced the international study result of TIMSS that used a similar assessment framework: knowing, applying, and reasoning (Mullis & Martin, 2017), stating that Indonesian students were capable in knowledge-comprehension yet weak in interpretation. Figure 2. Showed us that knowledge-comprehension level reached the almost similar point of 70, for upper middle, and lower group. On the application level, the upper group and middle group of students had relatively similar scores. However, the lower group of students was significantly lower. On interpretation, only the upper group of students was able to finish.

Gronlund (2003) states that among various types of assessment, it will provide high meaning if it is authentically designed. One of the characteristics of authentic assessment is if it uses a real world context (Gronlund, 2003; Johnson,

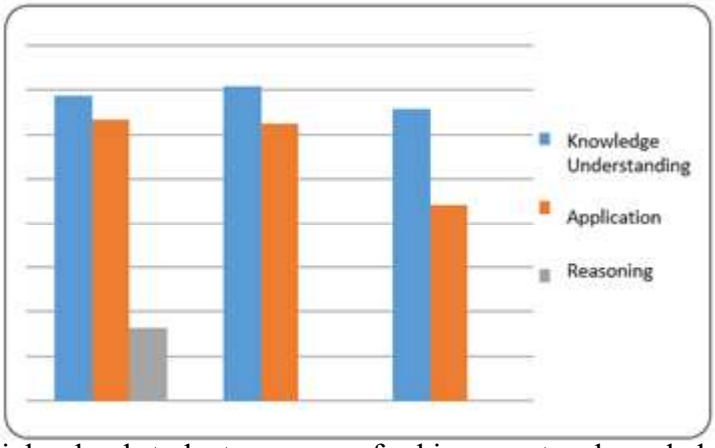


**Figure 2**. Junior high school students average of achievement on knowledge-comprehension, application, and interpretation level

2002). The real world context will make students feel the benefits because it is directly related to their lives. Problems become real and non-routine. Students are not able to solve it if they only rely on rote knowledge. Students must involve a variety of knowledge and skills. It is not enough just factual and conceptual knowledge, it requires more procedural and metacognitive knowledge. Various skills, both abstract and concrete skills are required, including multi-representation skills. In the context of thematic and integrated learning, learning has been designed contextually by taking into account the natural conditions of life and the level of cognitive development of students, so that various learning content is still packaged in an integrated manner through a network of themes or topics, not yet separated in detail into monodisciplinary subjects. This learning design needs to be supported by an integrated assessment system as well, although the assessment instrument must still be unidimensional. Because the assessment must be based on measurement activities, and valid measurement is a measurement whose measuring instrument is unidimensional (Wright & Masters, 1982).

During testing, the researcher also collected assessment instruments developed by teachers of a certain school. Part of the assessment instrument was attached to this research report. The researcher observed, discussed, and analyzed instruments. Compared to the instrument developed by the researcher, the researcher obtained several inventions:

a. Formulated indicator from a teacher was not enough to fulfill basic competence achievement. Basic competence needs analysis or interpretation skills (L3) to get a good achievement, but the indicator was only fulfilled to application level (L2)
b. There was an incompatibility between question and indicator. Compared to the developed assessment instrument, it was found several significant differences:

The question used real-life phenomena stimulus to make the lesson more authentic and meaningful. The question used various types of presentation: verbal, symbolic, visual, and mathematic to make sure they increased mental process and thinking ability. The question was more synchronized, both thematic and integrated learning because one set of questions only used one stimulus. Then, that stimulus was formulated into several sub-questions built-in every lesson.

Based on the process during the research, several important things that need to be

considered by teachers if they want to develop an assessment instrument in thematic and integrated learning as have been developed in this study.

*First:* Even though the instrument is designed in an integrated manner, each sub-question remains unidimensional referring to the indicators of competency achievement that have been formulated.

*Second:* There are several stages in instrument development, namely:

1. Identify the competencies to be measured

In a competency-based curriculum, the measure of competence that must be achieved by students is formulated in the form of Basic Competence (i.e KD). Basic competence is a minimum measure of competence that must be achieved by students. Because of the minimum size, the KD cannot be reduced but can be increased according to the conditions of the education unit. Regarding the development of thematic and integrated learning assessment instruments, the first thing to do is to identify the KD-KD that will be integrated into their learning.

2. Formulate indicators of achievement of KD

The development of the instrument must start from the formulation of indicators, both indicators of competency achievement and indicators of questions. The formulation of indicators is strived to fulfill the ABCD aspects (audience, behavior, condition, and degree) so that the composition of the instrument is clear and the resulting instrument is valid.

3. Identifying real phenomena as the context of assessment / stimulus questions

As described in the previous section, the assessment instruments in thematic and integrated learning must be authentic, among others, marked by the stimulus questions using real world phenomena (contextual). Therefore, before developing the instrument, the teacher must look for real-life phenomena that can be used as context. The use of phenomena as contexts can be done by adopting (using directly according to the original), adapting (taking but modifying certain parts as needed), or creating (developing new ones because no suitable phenomena are found). It is important to pay attention to scientific rules or ethics, if you adopt and adapt you must mention the source.

In the written test, contextual phenomena are used as stem questions, as seen in the PISA questions. The use of real cases as stem questions allows us to measure the literacy level of students who answer these questions. The use of real context in performance appraisal will ensure that the assessment is authentic.

4. Choose multiple representations

The more information that is written, the easier it is for someone to interpret the message, on the contrary, the more information that is implied, the more difficult it is for someone to interpret the message because they have to do an analysis. That's why in the development of the HOTs assessment instrument there must be more implied information, so that many students carry out a critical analysis.

It is usually easier to make implied information visual, symbolic, or mathematical, so the use of graphs, tables and the like in written tests is highly recommended, although information in verbal descriptions can be implied. Even performance appraisals, practical assignments, or carrying out certain activities are also not necessarily HOTs if the activity instructions are in the form of very guiding recipes. Students must be given space to think critically and be creative in performing performance tasks.

5. Develop instruments by paying attention to the signs of a good assessment instrument

In general, the preparation of assessment instruments has taken into account aspects of construction, substance, and language. Likewise, in the preparation of the HOTs assessment instrument, in addition to paying attention to the characteristics of higher-order thinking, the correctness of the substance, the accuracy of the construction, and the legibility of the language must also be considered.

## CONCLUSIONS

The results of this development research could be concluded that (1) Developed assessment model and instrument, according to the assessment from expert and practitioner, was on valid category, both construction and substance; (2) Practical, according to teachers, it was appropriate and able to be applied in integrated learning in junior high school. Also, it was interesting, fun, and more meaningful for several junior high school students, yet the question felt more difficult to solve than one developed by teachers; (3) testing result showed that competence of knowledge-comprehension and application was relatively high; the point was higher than standard. But interpretation competence was still lower than standard.

The results of this study are expected to be used as a meaningful assessment model in integrated learning in schools at the junior high school level. The knowledge domain assessment instrument is designed using a stimulus in the form of a real phenomenon that is authentic and contextual, then the sub-questions are unidimensional according to the competence or substance of various integrated subjects. Student performance is also designed to be a combination of cross-subject competencies that are packaged in the form of project assessments. The developed assessment model and instrument, apart from being interesting, fun, and useful, has several drawbacks, including being more difficult for students and reading too much so that students are more likely to experience boredom. Based on the conclusions and research findings, it is recommended to apply the assessment model that has been developed in thematic and integrated learning for other themes or materials. It is necessary to socialize the assessment model along with its implementation guidelines so that it can be understood and practiced well by junior high school teachers.

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