The effect of integrated science learning based on local wisdom to increase the students competency

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Abstract. The national education prioritizes the character building, religion, culture and the demands of the era in the 21st century. Local wisdom is very appropriate to build the student character which is a nurturant effect in the learning process in school. Understanding of local wisdom as one of the elements integrated into learning at school. Science learning in Junior High School based on the 2013 curriculum is presented in an integrated with themes related to the subject matter of Physics, Chemistry, Biology and Earth and Space Sciences. The observation results show that science learning in schools has not been presented in an integrated and has not yet integrated local wisdom. To integrate local wisdom requires an appropriate learning model. One learning model that can be used is an integrated learning model. Through integrated learning the students were provided with more comprehensive knowledge, so that students easily master science learning material. To implement an integrated learning model, teaching materials are needed in the form of lesson plan, student activity sheet, student book, and assessment. Therefore, integrated science learning based on local wisdom is implemented. The aim of this research is to know the effect of integrated science learning based on local wisdom on student competency. This research used quasi experiment method with pre-test post-test group control design. The research subjects of seventh grade in Junior High School in Padang, Indonesia. The data were collected use interview guide, observation sheet and learning outcome tests. The result shows that the effect of integrated science learning based on local wisdom to improving the student competencies include large category for knowledge domain and medium category for affective domain.

1. Introduction

Base on the stages of development of Junior High School Student and the demands of the 2013 curriculum, science learning is carried out in an integrated manner. The learning of science in Junior High School consist of a combination of subjects in Physics, Chemistry, Biology and Earth and Space Sciences which are integrated into the theme so that student understand meaningful relationship between the concept of subject matter. In the learning process, student was motivated to obtain information from various learning resource available around it. The role of the teachers was very important to increase the student competence. Teachers are expected to enrich students' knowledge in the form of activities that are in accordance with the social and natural environment around students. Thus, the teachers as a facilitator in process of learning must have competence.

Integrated learning is learning that is designed based on a particular theme to associate several subjects so that it can provide meaningful experience for students. For example, the theme of Flow and
Blood Pressure for junior high school students can be viewed from Physics, Biology, and Chemistry subject matter. Integrated learning provides breadth and depth of curriculum implementation, offering very many opportunities to students to bring about the dynamics in learning [1]. The integrated learning was the effort to integrating of knowledge, skill, attitude, and creative thinking skill use theme [2]. Integrated learning is carried out with the intention as the effort to increase learning quality, especially to balance density of curriculum material, and to adjust to the level of development of students. In addition, integrated learning provide opportunity for student to actively participate in the learning activities. Integration in learning can be presented in the form of themes which are the main thoughts or ideas that become the topic of learning. Integrated learning can increase students' motivation and learning outcomes [3, 4, 5]. Assessments in integrated learning are more appropriate to use authentic assessment [6].

The curriculum was connected with students' real-life experiences and carried out with an integrated approach [7]. Integrated learning, although rather complicated, can actually be applied in science learning in junior high school. With integrated learning students are expected to develop their potential. The implementation of integrated learning makes it easier for teachers to choose how to teach according to the potential possessed by students [8, 9]. Integrated learning can improve students' motivation and competency [7, 10, 11, 12, 13, 14, 15]. In Law number 20 of 2003 concern the system of national education explained that national education prioritizes religions, cultures and the demand of the time that show human characteristic of the 21st century. The importance of understand local cultures as one of element integrated into the system of education, especially learning in school. The content of local cultural was said to be integrated if there was implementation of values, traditions and local wisdom content in learning.

At present local wisdom is often used in various fields of study, including in the field of education. This is done in order to support the progress of the nation. The 2013 curriculum requires active and creative students through a scientific and integrated learning approach. Integrated learning based on local wisdom can be one method in realizing quality education. The local wisdom is very appropriate to build student character which is a companion effect of learning in school [16, 17, 18].

Local wisdom was the heritage of ancestor in the value of life that are united in religions, cultures and customs. Integrated learning based on local wisdom was integrated learning by integrating local wisdom in accordance with the environment around students so that learning becomes contextual. The contextual approach can help teachers associate the material taught with the environment around the students and motivate students to apply the knowledge they have in their daily lives so that learning becomes meaningful.

Integrated learning based on local wisdom can fortify students from foreign cultural influences that can damage the character of students. Knowledge of local wisdom is usually only known by local figures. With integrated learning based on local wisdom, students can get to know the local culture so that the desire arises to maintain and preserve it. The values contained in each local wisdom can also be a reference in shaping the character of students. Therefore, integrated learning based on local wisdom is important as an effort to shape the character of students.

Based on observation, science learning at Junior High School in Padang has not been presented in an integrated manner and has not yet integrated local wisdom. To integrate local wisdom, a learning model is needed. One of integrated learning models that can be use is an integrated type learning model. Through integrated learning the student can has a more comprehensive understanding of several aspect, so that student can master science learning material.

The results of interviews with Junior High School science teachers in Padang obtained information that students were less active in learning process. Student was less motivated to ask questions or express opinions. In the learning process students tend to record rather than understand the material being taught, so most students (58%) have not yet finished learning science. There are still many students who don't care about their surroundings. To overcome this problem the teacher must find the right way in the learning process. One solution to this problem is the implementation of an integrated science learning based on local wisdom model to increase the students’ competency.
Integrated learning based on local wisdom is done by integrating local wisdom in student learning. One effort to integrate local wisdom into learning can be done by developing teaching materials which contain local wisdom related to the theme of the lesson. Local wisdom-based learning is effective in the learning process. Some research relevant to local wisdom-based learning can be used as empirical evidence that local wisdom has the potential to be developed in learning. The use of potential-based modules in regions with a theme where I live shows maximum learning completeness [19]. The use of integrated modules of local wisdom in effective learning enhances students’ literacy skills [20]. The science teaching materials based on local wisdom were effective in improving students critical thinking skill [21].

Integrated learning based on local wisdom is learning that utilizes local excellence in aspects of economics, arts, culture, human resources, language and others in learning. In integrated learning based on local wisdom students learn to start from surrounding environment which is concrete. This can be easier the student to understand the lesson gradually. The process of understanding students' knowledge will be easier if the teaching material used was in accordance with local wisdom of environment around the students. The problem of research was formulated as follow: How was the effect of local wisdom-base Integrated Science learning on increasing the competence of Junior High School student in science lessons?

2. Method
This research used the quasi-experimental method with design of the pretest-posttest control group [22]. The study was conducted on student in science subject. The research phase is: (1) conducted a preliminary survey, (2) compiling a plan for implementing learning, student worksheets, and research instruments, (3) giving a pre-test, (4) treatment by implemented the integrated learning based on local wisdom to the experimental class student, while the control class student carry out lectures with the lecture method, (6) provide post-test, (7) data analyze and result interpret. Subjects of the study were Junior High School students in Padang. The instruments used in the study were; interview guides, observation sheets, and the learning outcomes test. The test result data was analyzed quantitatively use the effect size Cohen's formula to find out effect of the learning model on student competencies in science learning.

3. Result and Discussion
3.1. The effect of integrated science learning based on local wisdom on students competency
The effect of integrated science learning based on local wisdom in improving student competence is viewed from the knowledge domain. The magnitude of the effect was analyzed after testing the differences of the competencies of the experimental and control class student. Before analyzed the data to find out the differences in student competencies, the data distribution normality test and data homogeneity test were first carried out. The result of normality data distribution test show that the competency of student in the experimental class and the control class was homogeneous, as well as the competency of student after learning.

| Session | Experiment Class | Control Class |
|---------|------------------|---------------|
|         | Pre-test | Post-test | Pre-test | Post-test |
| 1       | 65.3     | 83.4      | 74.2     | 67.1      |
| 2       | 70.2     | 84.4      | 74.5     | 67.9      |
| 3       | 71.8     | 88.2      | 78.0     | 70.0      |
| 4       | 73.1     | 88.0      | 78.9     | 72.5      |
| Average | 70.1     | 86.0      | 76.4     | 69.4      |
Based on the results of the normality test and the homogeneity test of the competence score of the experimental and control class students, can be determined that different competency test of student can use the t-test. After an average difference test on student competency (Table 1) before learning, results showed that average competency of the experimental class and control class students did not differ significantly ($\alpha = 0.05$). Thus, it can be stated that the competency of students before learning was the same in both classes. The different test scores of student competency scores after learning showed that the average competency score of the experimental class students and the control class differed significantly ($\alpha = 0.05$). Thus, it can be stated that the competency of student after learning was different in both classes. The average competency of the experimental class students is higher than the control class.

Furthermore, an analysis was carried out to determine the effect size of the learning model on students' knowledge competencies. The effect of integrated science learning based on local wisdom on increasing competency of Junior High School students in science lessons has an effect size of 1.9. These results indicate that effect of integrated science learning based on local wisdom on students learning outcomes includes a large category.

Analysis to determine the effect size of the learning model on the competencies of student attitudes based on attitudes in session 1 and session 4 (Table 2). The effect of integrated science learning based on local wisdom on increase the competency of Junior High School students’ attitudes in science lessons is an effect size of 0.51. These results indicate that effect of integrated science learning based on local wisdom on students learning outcomes was included in the medium category.

Table 2. The Student Competency of Affective Domain

| Affective | Session 1 | Session 2 | Session 3 | Session 4 |
|-----------|-----------|-----------|-----------|-----------|
| Curiosity | 85.4      | 91.8      | 89.1      | 90        |
| Cooperate | 85.4      | 81.8      | 80.9      | 90        |
| Discipline| 78.2      | 77.3      | 84.5      | 80.9      |
| Honest    | 76.4      | 78.2      | 78.2      | 82.7      |
| Responsible| 73.6      | 73.6      | 74.5      | 77.3      |
| Average   | 79.8      | 80.5      | 81.3      | 84.2      |

Table 2 shows that student attitudes are in the category both in session 1, very good category in sessions 2, 3, and 4. The attitude of students in sessions 1 to 4 shows improvement. This shows that by using integrated science learning based on local wisdom, student attitudes are better.

3.2. Discussion

The science learning based on local wisdom model influences the competence of student in experimental class with the average value of students' knowledge competencies higher than the control class. Learning in the experimental class that combines subject matter with local wisdom can provide a broader experience for students, compared to the lecture learning model. Through local wisdom knowledge integrated in natural science is able to solve a problem [23]. The implementation of local wisdom-based science learning models provides opportunities for students to develop their competencies. Students become active in the learning process by applied the science learning based on local wisdom model.

The results of data analysis showed that the competency of experimental class students was higher than control class. The student competency improvement is seen at each meeting. This is because at the first meeting students were still adjusting to the applied science learning based on local wisdom model, but at the next meeting students were able to follow well so that students' competencies improved. The students learning outcome increase after implement the local wisdom-based learning [24, 25]. Discussion activities carried out in learning provide more opportunities for students to
develop thinking skills. The student activities and competencies higher when students hold discussions in groups than when students only receive information from teachers [26].

Through the implement of science learning based on local wisdom model can develop ability of student to think and national character [27, 28]. Through the implement of science learning based on local wisdom model influence student competencies and are able to connect original science that is owned by students with science acquired in school [29]. Basic science competencies are measured by student learning outcomes tests that contain subject matter. The second influence is seen from the observation sheet data when learning. The result of observation sheet data analysis showed that through science learning based on local wisdom model can increase students’ activity when learning. The implementation of science learning based on local wisdom model can improve student competence.

The schools that handle character education of student seriously tend to have high academic performance [30]. Based on the analysis of student character development, the development of learning materials based on local wisdom was able to develop positive character of students. Character improvement in this study is classified as moderate because the research was only conducted in four meetings so that it could not form a habit. One of the principles of character education is sustainable, which implies that the process of character development is a long process starting from the beginning of students entering to completion of an education program [31]. Integration of local wisdom with learning was effective to increase the cognitive aspects of students. By implementing sustainable knowledge-based learning locally it is hoped that not only can cognitive aspects be improved but also students can develop character. This sustainable principle is very important because if character education is carried out continuously, students will get used to it by themselves so that slowly the habit will be formed into a positive character.

Through the design of science learning based on local wisdom model can improve positive character of student [32]. Implementation of science learning based on local wisdom can increase the students learning outcome. The research cases and problems raised from the area around the life of students will motivate students to learn, because learning is contextual and in accordance with what students experience directly, so that learning can make learning more meaningful [33, 34] In addition, local wisdom-based learning will train students to care more about their environment, so they can train them to be wiser in empowering the potential in their respective regions. Through the problems given, students are asked to find solutions about cases that occur around them.

4. Conclusion
The effect of integrated science learning base on local wisdom to increase student competence is viewed from the domain of knowledge and attitude. In the knowledge domain, there was the significant difference in the competency of student who apply integrated science learning based on local wisdom with knowledge of students using lecture learning methods. The effect of local wisdom-based integrated science learning on the competency of knowledge of junior high school students in science lessons includes a large category. The effect of integrated science learning base on local wisdom on the affective competencies of the Junior High School students in science lessons includes the medium category. The attitude of students in each session showed an increase. The attitude of students becomes better after applying integrated science knowledge based on local wisdom.

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References
[1] Trianto 2011 Model Pembelajaran Terpadu dalam Teori dan Praktek (Jakarta: Prestasi Pustaka)
[2] Sutirjo dan Sri Istuti Mamik 2005 Tematik: Pembelajaran Efektif dalam Kurikulum 2004.
rpadu pada tema rbasis masalah untuk meningkatkan literasi sains siswachnology Society pada pembelajaran IPA terpadu.

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[3] Freudenberg B, Brimble M and Vyvyan V 2010 The Penny drops: Can work integrated learning improve students’ learning? e-Journal of Business Education & Scholarship of Teaching, 4 42-61

[4] Fitriani S, Binadjia A, Supardi and Imam K 2012 Penerapan model Connected bervisi Science Environment Technology Society pada pembelajaran IPA terpadu. Unnes Science Education Journal 1 111-8

[5] Listyawati M 2012 Pengembangan perangkat pembelajaran IPA terpadu di SMP Journal of Innovative Science Education 1 61-69

[6] Bosco A M and Ferns S 2014 Embedding of authentic assessment in Work-Integrated Learning Curriculum Asia-Pacific Journal of Cooperative Education 15 281-90

[7] Gnanakan K 2013 The integrated learning experience William Carey International Development Journal 2

[8] Sukayati 2004 Pembelajaran tematik di SD merupakan terapan dari pembelajaran terpadu. Makalah disampaikan pada dikel instruktur/pengembang matematika SD jenjang lanjut di PPPG Matematika Yogyakarta.

[9] Sanusi U 2014 Integrated learning dalam pendidikan agama Islam Taklim: Jurnal Pendidikan Agama Islam 12

[10] Haidir I, Azis A and Samad A 2012 Penerapan model pembelajaran terpadu tipe Connected dalam rangka meningkatkan hasil belajar fisika peserta didik SMP Negeri 29 Satap Malaka Kab. Maros. Jurnal Sains dan Pendidikan Fisika 8 237-42

[11] Izzati N, Hindarto N and Pamela Sari S D 2013 Pengembangan modul tematik dan inovatif berkarakter pada tema pencemaran lingkungan untuk siswa kelas VII SMP Jurnal Pendidikan IPA Indonesia 2 183-8

[12] Qolbiyah and Syifaul R D 2013 Penerapan pembelajaran IPA terpadu tipe Shared dengan model pembelajaran kooperatif tipe Student Team Achievement Division pada tema senter plastik Jurnal Pendidikan Sains e-Pensa 01 47-53

[13] Fithriyah M 2015 Pengembangan modul pembelajaran berbasis tematik terpadu pada tema peduli terhadap mahluk hidup untuk siswa kelas IV MIT Ar Roihan Lawang Malang Akademika 9 243-60

[14] Laksana D N L, Kurniawan P A W and Nifitalia I 2016 Pengembangan bahan ajar tematik SD Kelas IV berbasis kearifan lokal masyarakat Ngada Jurnal Ilmiah Pendidikan Citra Bakti 3 11-110

[15] Dallinger S 2016 The effect of content and language integrated learning on students english and history competences Journal Learning and Instruction 41 23-31

[16] Wibowo A and Gunawan 2015 Pendidikan karakter berbasis kearifan lokal di sekolah (konsep, strategi, dan implementasi) (Yogyakarta: Pustaka Pelajar)

[17] Effendi N 2013 Kearifan lokal menuju penguatan karakter sosial: Suatu tantangan dari kemajemukan budaya di Sumatera Barat Makalah Workshop Internalisasi Nilai Budaya pada Komunitas Remaja 107-115

[18] Pamungkas A, Subali B and Lunuwihi S 2017 Implementasi model pembelajaran ipa berbasis kearifan lokal untuk meningkatkan kreativitas dan hasil belajar siswa Jurnal Inovasi Pendidikan IPA 3 118-27

[19] Rozhana K M 2015 Pengembangan Modul Berbasis Potensi Daerah Malang Kelas IV Semester II Dengan Tema Tempat Tinggalku (Malang: Pascasarjana Universitas Negeri Malang)

[20] Nisa’ A, Sudarmin and Samini 2015 Efektivitas penggunaan modul terintegrasi etnosains dalam pembelajaran berbasis masalah untuk meningkatkan literasi sains siswa Unnes Science Education Journal 4 1049-56

[21] Wahyuni S 2015 Developing science learning instruments based on local wisdom to improve students’ critical thinking skills. Jurnal Pendidikan Fisika Indonesia, 11(2), 156-161.

[22] Creswell J W 2008 Research Design: Qualitative, Quantitative and Mixed Method Approaches
(New Delhi: SAGE Publications)

[23] Mungmachon M R 2012 Knowledge and local wisdom: Community treasure *International Journal of Humanities and Social Science* **2** 174–81

[24] Azizahwati, Maaruf Z, Yassin R M and Yuliani E 2015 Pengembangan modul pembelajaran fisika SMA berbasis kearifan lokal untuk meningkatkan hasil belajar siswa *Prosiding Pertemuan Ilmiah XXIX HFI Jateng & DIY* 70-3

[25] Hartini S, Misbah H and Dewantara D 2017 The effectiveness of physics learning material based on South Kalimantan local wisdom *AIP Conference Proceedings* **1868**

[26] Subagia I W and Wiratma I G L 2008 Penerapan model siklus belajar berbasis tri pramaana pada pembelajaran sains di sekolah *Jurnal Pendidikan dan Pengajaran Undiksha* **41**

[27] Utami R P, Noviar D and Agustina E H 2012 Aplikasi model VCT (Value Clarification Technique) berbasis local wisdom sebagai upaya internalisasi pendidikan karakter untuk meningkatkan kreativitas berpikir dan hasil belajar biologi siswa *Prosiding Seminar Biologi* **9**

[28] Suastra I W and Yasmini L P B 2013 Model pembelajaran fisika untuk mengembangkan kreativitas berpikir dan karakter bangsa berbasis kearifan lokal Bali *Jurnal Pendidikan Indonesia* **2** 221–35

[29] Suastra I W, Tika K and Kariasa N 2011 Efektivitas model pembelajaran sains berbasis budaya lokal untuk mengembangkan kompetensi dasar sains dan nilai kearifan lokal di SMP *JPPP* **5** 258–73

[30] Pala A 2011 The need for character education *International Journal of Social Sciences and Humanity Studies* **3** 1309-8063.

[31] Kemendiknas 2010 *Pengembangan Pendidikan Budaya dan Karakter Bangsa* (Jakarta: Kementerian Pendidikan Nasional Badan Penelitian dan Pengembangan Pusat Kurikulum)

[32] Subali B, Sopyan A and Ellianawati E 2015 Developing local wisdom based science learning design to establish positive character in elementary school *Jurnal Pendidikan Fisika Indonesia* **11** 1–7

[33] Santoso A M 2010 Konsep diri melalui pendidikan berbasis keunggulan lokal sebagai model pendidikan berkarakter dan berbudaya bangsa di era global *Proceedings of the 4th International Conference on Teacher Education, Universitas Pendidikan Indonesia* 477-86

[34] Mumpuni K E 2013 Potensi pendidikan keunggulan local berbasis karakter dalam pembelajaran biologi di Indonesia *Prosiding Seminar Nasional X Pendidikan Biologi, FKIP Universitas Sebelas Maret*, 1-7