Development of Life Skill-Based Learning Instruments: Biotechnology Material in Junior High School

Pengembangan Perangkat Pembelajaran IPA Berbasis Kecakapan Hidup: Materi Bioteknologi di SMP

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Abstract

The result of preliminary observations in Empu Tantular Semarang junior high school showed that the learning instruments was still focused on the achievement of cognitive competence. The present study aimed to develop a life skill-based learning instruments of biotechnologi material. Learning instruments including syllabi, lesson plans, worksheets, scale attitudes sheets, and vocational skills assessment sheet, as well as to test its feasibility and effectiveness. This study was Research and Development, whereas the trial product design was a One Shot Case Study pattern. Trials of limited scale and large scale were done in the student of class IX at odd semester of year 2014/2015. The results of the three expert assessment of learning instruments showed very feasible criteria to be used. Inter-rater correlation analyzes were performed using the SPSS16 program which obtained a yield of 0.99. It indicated that the inter-rater reliability was exceptionally high. Classical completeness to the cognitive learning, affective and vocational skills of students of class IX A were 92.1%; 97.4%; 92.1%, respectively. Meanwhile, the results of class IX D were 74.4%; 94.9%; 100%, respectively. The percentage of student who reach the level of adherence to the learning ≥61% were 100% in class IX A and 87.2% in class IX D. Therefore, the developed learning instrument was fit to be used and also effectively applied in the Empu Tantular Semarang junior high school. Beside of improving student cognitive competence in Empu Tantular Semarang junior high school, development of life skill-based learning instruments can also provide knowledge and skills that can be used so that students can make a positive contribution in later life as a member of the family and society.

Abstrak

Hasil Observasi awal di SMP Empu Tantular Semarang, menunjukkan perangkat pembelajaran yang diterapkan masih terfokus pada pencapaian kompetensi kognitif. Penelitian ini bertujuan untuk mengembangkan perangkat pembelajaran IPA berbasis kecakapan hidup materi bioteknologi yang meliputi silabus, RPP, LKS, dan instrumen penilaian serta menguji kelayakan dan efektivitasnya. Metode penelitian yang digunakan adalah Research and Development (R&D). Desain uji coba produk menggunakan pola One Shot Case Study. Uji coba skala terbatas dan skala luas dilakukan pada peserta didik kelas IX semester gasal tahun ajaran 2014/2015. Hasil penilaian dari ketiga pakar terhadap silabus, RPP, LKS, lembar skala sikap, dan lembar penilaian kecakapan vokasional mencapai kriteria Very Feasible digunakan. Analisis korelasi inter rater yang dilakukan menggunakan program SPSS16 memperoleh hasil sebesar 0,99. Hal ini menunjukkan bahwa reliabilitas inter rater/antar penilai tergolong sangat tinggi. Ketuntasan klasikal untuk hasil belajar kognitif, afektif dan kecakapan vokasional dari kelas IX A berturut turut 92,1%; 97,4%; 92,1% dan kelas IX D berturut turut 74,4%; 94,9%; 100%. Persentase jumlah anak yang mencapai tingkat keterlaksanaan pembelajaran ≥ 61% dari kelas IX A sebesar 100% dan kelas IX D sebesar 87,2%. Perangkat pembelajaran yang dikembangkan Very Feasible digunakan dan efektif diterapkan di SMP Empu Tantular Semarang.

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INTRODUCTION

Science learning process primarily concerns on giving direct learning experience to develop thinking skill, working, and scientific attitude. The implication, at school, Science learning would be better to be directed not only to know, to remember, or to understand knowledge, but also to encourage students to use the given knowledge in a daily life (DBE, 2007). Learning instrument becomes an important aspect in determining the success of science learning process.

Compiling the learning instrument needs to be fitted to the right learning model in order to fulfill the need of the students in learning process. The life skill integrated model is one of the learning models that gives not only the academic knowledge but also certain skills that aims to reach the students' competencies, so it can be implemented in their real daily life. The characteristic of life skill integrated model can be seen from the learning instrument that put the life skill elements in the indicator and it is reflected through the learning activities so that the students' activities will be in accordance with their daily life context (Depdiknas, 2007). Therefore, it is important to see the characteristic of a learning material in order to adjust it with life skill that can be developed. Biotechnology is one of the science subjects that is applicative, because the product resulted from it is familiar to our daily life and it can be related to the life skill aspect (Purwianingsih *et al.* 2009).

The preliminary research conducted in SMP Empu Tantular Semarang shows that the learning instruments used by the science teacher are syllabus, lesson plan, and cognitive assessment. In fact, the teacher is emphasizing in giving the material and questions directly which administer to the cognitive competency achievement. It means that the learning process given by the teacher is still focus on developing the thinking skill. The thinking skill in the cognitive domain does not give a fully provision which can be used in the students' life in the future. All of the students grade IX show that they are able to achieve the science target of the study because the teacher always gives them a remedial to those who have not fulfill the target of the study. Unfortunately, that does not show that the students are already having a life skill provision. Although there are students' life skills appearing in the learning process, it is designed and developed accidentally by the teacher. Meanwhile, life skill is important to be had by the students because it gives them quality of life in the society (Ghombavani *et al.* 2012).

This research designs learning activities that directs the students to make a *soyghurt* that is one of the biotechnology food products coming from soy milk. Soy milk is easy to get because it is produced largely from the soybean industry in Semarang. *Soyghurt* is easy to be made and can be created based on our need.

The learning model in this research is *project based learning* which integrates the vocational skill in the indicator and designs the learning process with the method that aim at the contextual learning and cooperative. The given learning activities aim to give the vocational skill that is knowledge provision and skill which can be implemented in the students' daily life later. The learning evaluation is based on the life skill using a written test and a performance test because either the knowledge got by the students or the process in getting the knowledge is the important aspect in the life skills (Rassool & Sharifi 2008).

This research aims to develop thte science learning instruments in biotechnology material including syllabus, lesson plan, student worksheet in making *soyghurt*, assessment instrument implemented to the students grade IX SMP Empu Tantular Semarang, testing the feasibility and analyzing the effectivity of the product which is developed. Product feasibility which is developed is measured based on the validity result/expert assessment and the product effectivity is measured based on the students learning outcomes in the biotechnology material including the cognitive domain, affective, and vocational skill, and also how far the biotechnology learning material based on the life skill is being implemented.

METHODS

This research was conducted using *Research and Development* (R&D) procedure modifying from Sugiyono (2012) and the research stages were identifying the potential and problem, collecting the data and designing the product, validating and revising the design, testing the product in a limited scale and revising the product, testing the product in a broader scale and revising the product, and making the final product. The research design in the limited and broader scale used *One Shot Case Study* pattern. Product testing in the limited and broader scale was done to the students grade IX SMP Empu Tantular Semarang year 2014/2015. The sample was taken simply based on the provision between the teacher and the researcher. The sample used in the limited scale testing is 42 students of class IX B while the broader scale testing uses 77 students of class

IX A and class IX D, the sample which was used in the limited scale testing is different from the broader scale testing.

The life skill learning instrument is appropriate to be used if each assessment from three experts is $\geq 67\%$ (reasonable criteria) and to be implemented effectively if the classical completeness is $\geq 70\%$ for the cognitive learning outcomes score, vocational and affective learning outcomes as much as $\geq 70\%$ of students reaching $\geq 61\%$ on how far the learning process is being implemented. The data of feasibility assessment of the learning instrument were analyzed percentage descriptively by the experts, the learning outcomes data were analyzed descriptive quantitatively, and the data on how far the learning process is being implemented were analyzed percentage descriptively.

RESULTS AND DISCUSSION

The learning instrument of biotechnology material used by the science teacher at SMP Empu Tantular Semarang is including yearly program, semester program, syllabus, lesson plan, and cognitive domain assessment. The learning model used by the teacher is *Direct Instructional, Cooperative Learning* using discussion information method. All of the environments such as family, school society, and the society itself have a responsibility in giving the students the life skill provisions, but only some of the science learning which is integrated its material with a life skill. The science teacher still is focus on the cognitive competence achievement. It can be seen from the teacher's learning instrument which consists of cognitive competence indicator and cognitive assessment. The skill which is developed in the learning process still is thinking skill. Meanwhile, the students actually need a competency that will be useful in their future life.

The potential existed in SMP Empu Tantular is the science laboratory along with the facilities that can be used by the teacher in teaching science. Fortunately, in Semarang, there are many soybean industries that produce food product like soybean milk. So, this soybean milk can be created as a biotechnology food product, such as *soyghurt*. Therefore, the learning process can be designed to provide the students with the vocational skill that is the skill in making *soyghurt* that can be used in their daily life.

The improvement of quality of learning process can be done by enriching the variation of learning method and model which has to be fitted to the material and the students' condition.

An innovative learning is strongly determined by the teacher creativity in presenting the material based on the learning source that she has (Haryono 2009). Biotechnology is the material that relates to our daily life and it can be related to the life skill. Science learning which is integrating with the life skill can be implemented in the biotechnology material. The life skill needs to be developed in the learning process based on the need of the students, school potential, and society. Vocational skill is suitable with the characteristic of biotechnology material and the students' need in accompanying the thinking skill given by the teacher. Society potential which is related to biotechnology field is soybean industry that is easily found in Semarang. This industry produces not only *tempe* (fermented soybean) but also soy milk that can be turned into simple biotechnology food product like *soyghurt*. The soy milk can be used as a learning source in biotechnology material. So, the science leaning in biotechnology material has a chance to be presented as a vocational skill learning based through making the *soyghurt* by the students.

The assessment used by the teacher is the result of the written test and students' homework. The assessment aspect is one of the keys to show the accomplishment of the learning goal. The assessment needs to be done authentically as a process, done by the teacher, of collecting information about the development and the learning accomplishment which is done by the students through the various techniques that can be revealing, proving, or showing accurately that the learning goal is mastered and accomplished (Ngadip 2009).

The learning instrument used by the teacher and its implementation in the learning process is still lack and need to be developed. The students need knowledge and skill that can be used in their life. Therefore, the development of science learning instrument life skill based need to be integrated on the syllabus, lesson plan, students worksheet as a guide in making *soyghurt* and as the authentic assessment.

In the data collecting stage, the data which is obtained are the life skill that relevant with the biotechnology material and life skill that needed by the students, the data about the characteristic of the life skill integrated model, the principal of the learning instrument based life skill, and the characteristic of biotechnology material. The life skill which is mostly needed by the students is the vocational skill; this skill is relevant with the biotechnology material and is suitable with the demand of Standard Competence and

Basic Competence. The integrated life skill model is not a subject that can stand independently and it does not need additional hours in its implementation but it is done integrated in the subject. The characteristic of this model is and giving certain knowledge and skill that is applicable in the students' real life. The learning instrument which is developed are syllabus, lesson plan, students' worksheet, attitude scale in the affective assessment, and vocational skill assessment instrument.

The vocational skill which is suitable with the need of the students' need, school potential, and society becomes the main aspect concerned in this research. It aims to give a useful knowledge and skill that can be used by the students in their daily life activity so that it can give a positive contribution in their future life as a member of a family or a society. Therefore, in this research, the data of students' need, school potential, and society is strongly needed to develop the life skill based learning instrument.

The development of life skill based learning instrument aims to complete and to make the teacher leaning instrument more perfect. The perfectness is done by adding the life skill competence and affective competence, arranging the indicator that relates each other functionally in order to achieve the competency, making the students' worksheet in a vocational skill activity, and making an authentic assessment covering the cognitive domain, affective, and vocational skill.

The developed syllabus contains standart competence, basic competence, affective competence, and skill competence. Indicator of vocational skill is supported by the cognitive and affective indicator that is demanding the students to master the competency completely which are knowledge, attitude, and skill. The learning material is being responsible scientifically and put the daily event commonly happened in the society, and the given portion is appropriate with the students' development. The scope of the indicator and learning material is adequate to support the life skill development. It shows that the syllabus has already fulfilled the principal in developing the syllabus according to BSNP and life skill integrated model.

The given learning material is designed to encourage the students to obtain knowledge and skill that can be used in their daily life activity. The learning activity is contained in the syllabus and completed in the lesson plan through an explanation and teacher and students activity. The learning activity is given through presenting pictures via power point so that it can be easily accepted by the students. food product and simple biotechnology food product is presented in the class as a source of study. The students write the definition of biotechnology according to the scheme in the power point media, make a table, collect information in pair, identify the picture, have a discussion, lab work, and presentation. Those activities show that the learning activity is using contextual approach and focus on the students' activeness.

The lesson plan is developed according to the principals of development based on the life skill based integrated model. Indicator and competence achievement are made in the syllabus and lesson plan including the cognitive indicator and vocational skill indicator, and affective indicator. The vocational skill indicator in the learning instrument produces an interesting and a good quality of *soyghurt*. It means that the students are demanded to have not only the skill in making *soyghurt* but also making a good quality of *soyghurt*. Vocational skill indicator is supported by the cognitive indicator which is made to lead the students finding the concept of making *soyghurt*. The life skill learning instrument is shown by the existence of life skill based integrated in the syllabus and lesson plan. Based on the competence achievement indicator made on the syllabus and developed lesson plan, it shows that learning instrument already fulfills the criteria of life skill based integrated learning.

The students' worksheet is a worksheet that has to be done by the students. The worksheet has to be prepared by the teacher thoroughly and presents the proper knowledge and the skill. The worksheet must fulfill at least the criteria relating to whether the basic competence is accomplished and mastered by the students or not (Chodijah *et al* 2012). The developed worksheet contains instruction in making *soyghurt,* questions about principal in making *soyghurt*, and instruction for the assignment report. Worksheet also is used as a learning media and source of the assessment form from one of cognitive indicators. The cognitive indicator which is meant is indicator which is made in purpose to support the vocational skill indicator which is explaining the principals in making *soyghurt*.

The assessment instrument which is developed covering th cognitive assessment, affective, and vocational skill. The assessment is done authentically to find out all of the competence domains accomplished by the students'. the assessment forms used are multiple choice, the students' activity and report, group discussion based on the question provided on the worksheet, and attitude scale. The assessment used is already

covering the completeness of whole indicators. It means that the assessment can give information about the whole competence which is mastered by the students.

The junior high school science learning process is not only as pure knowledge and developing of thinking skill, but it should be applicative, oriented on the learning skill, curiosity, building a care and responsibility attitude toward the surrounding environment (Widhy 2013). This research is developing the learning instrument which is applicative through the integrated life skill which is the vocational skill. The contextual learning has a big potential to develop the skill of life (DBE 2009). The thinking ability, study skill, and curiosity are developed using the contextual learning approach and the life skill based integrated. The responsible and care attitude toward the surrounding nature and social environment are developed through the facts and events that happen in the social life such as the effect of biotechnology implementation and the effort in solving it as a part of the learning material and source of the study.

The assessment on the learning instrument feasibility is done by the three experts, they are two lecturer from biology major UNNES and a science teacher class IX from SMP Empu Tantular Semarang. Those three experts assess the same aspect using the same feasibility assessment sheet also. The feasibility of the learning instrument including syllabus, lesson plan, students' worksheet, the making of *soyghurt*, and assessment instrument (attitude and vocational skill) are measured based on the result of feasibility assessment done by the three experts. 1st and 2nd are the experts from UNNES, they are biology lecturers. They assess the product twice, because in the first assessment it shows that the product need to be revised. Therefore, the product is being repaired based on the first assessment result by the 1st and 2nd experts, and then it is reexamined. The 3rd experts assesses the product along with the 1st and 2nd experts when the second assessment is done by the 1st and 2nd experts so that the product which is being assessed by the 3rd experts is the product which has been repaired previously. The detail assessment result toward the learning instrument is presented on the table 1 as follows:

Table 1 shows that in the first assessment by the 1st and 2nd expert toward the syllabus design, lesson plan, worksheet, and assessment instrument are still lacked so that it need to be improved. The next product has been fixed and then it is being reexamined by the experts. The reparation on the learning instrument is done based on the suggestion from the experts in the lacked aspect. The 3rd assessment done by the 1st, 2nd, and the 3rd experts shows the learning instrument design achieves very feasible criteria, so the product can be tested in the limited scale.

The second assessment of the 1st and 2nd experts and also assessment from the 3rd expert toward the learning instrument (syllabus, lesson plan, worksheet, affective assessment instrument, and vocational skill assessment instrument) then it is analyzed its reability using *Intraclass Corelation Coeficient* with the SPSS16 program reaching 0,99 which is included into very high reability. The correlation measurement between the assessor/*inter rater* aims to find out the consistency between the *rater*, the more the consistency of the product assessment, the more it is reliable. The high reability from the rater can be achieved because of the consistency from the three experts has the high similarity in giving score in the aspects which is graded. This tells that the three experts as a subject has the same vision on the object being assessed which is the life skill based learning instrument.

The limited scale test was done to 42 students of SMP Empu Tantular Semarang year 2014/2015. The result was used to follow-up the product before it enters to the broader scale test on the result of how far the learning implementation is achieved by the students. In this research, It is already determined that the product can be tested in a broader scale if as much as $\geq 70\%$ of the students reaching the level of learning adherence $\geq 61\%$. The level of the learning adherence using the developed product ix presented on the Table 2

Table 2 shows that the level of learning adherence fulfills the achievement target that is The number of the students who achieve the level of learning adherence $\geq 61\%$ are71,4% therefore, the product can be used in the broader scale test.

The product test on a limited scale is done based on the lesson plan design. Based on the result, it shows that the success of learning process is determined not only with its excellent planning but also its execution or implementation. It is proved that with the learning instrument product which gets the feasibility test from the three experts and the result shows that it is very feasible to be used, in fact, when it is implemented, the lack of the learning instrument is still exist. A good learning plan through the learning instrument need to be balanced with a good implementation also, so the learning based life skill which is designed can be succeed along with its learning goal that is giving provisions that can be used by

Table 1. The experts assessment result on the learning device feasibilty

Product	Percentage (%)				
	1st expert assessment		2nd expert assessment		3rd expert assessment
	1st	2nd	1st	2nd	
Syllabus	66,7 Feasible	93,9 Very Feasible	75,7 Feasible	96,9 Very Feasible	93,9 Feasible
Lesson Plan	78,3 Feasible	91,7 Very Feasible	65 Fairly Feasible	96,7 Very Feasible	95 Very Feasible
Worksheet	80,7 Feasible	98,2 Very Feasible	82,4 Feasible	98,2 Very Feasible	98,2 Very Feasible
Affective assessment instrument	60 Fairly Feasible	100 Very Feasible	86,7 Very Feasible	96,7 Very Feasible	100 Very Feasible
Vocational skill assessment instrument	73,3 Feasible	100 Very Feasible	80 Feasible	93,3 Very Feasible	93,3 Very Feasible

Table 2. The level of learning adherence based on the life skill in the limited scale test

No	Criteria	Amount (people)	Percentage (%)	Note
1.	Very High	10	23,8	
2.	High	20	47,6	The number of the students who achieve the level of learning adherence ≥ 61% are 71,4% therefore, the product can be used in the broader scale test with a little revision.
3.	Fair	12	28,6	
4.	Lack	0	0	
5.	Low	0	0	
∑ the students who achieve the learning adherence ≥ 61%		30	71,4	
∑ the students who achieve the learning adherence ≤ 61%		12	28,6	

the students in their future life. Along with that things, Jalmo (2008) states that life skill needs to be practiced purposively and planned, and the teacher has to be a perfect fasilitator in the learning process. Therefore, besides the learning plan which is stored in the learning instrument, the learning implementation which is based on the life skill becomes a concerned aspect to achieve the learning success based life skill.

This research analyzes the product feasibility which is developed in order to test its effectivity. The learning instrument effectivity is measured based on the completeness of the target of study (cognitive, affective, and vocational skill) of the students classically and the level of learning adherence in the broader scale test. The learning instrument is said effectively if the classical accomplishment ≥ 70% for the cognitive learning outcomes, affective, and vocational skill as much as ≥ 70% of the students who achieve the level of learning adherence ≥ 61%. The students learning outcomes in the broader scale test covering the cognitive domain, affective, and vocational skill is presented in the Table 3:

Table 3 Students learning outcomes in the broader scale test

Learning Outcomes	Classically completeness (%)		Effective Criteria
	ClassIX A	Class IX D	
Cognitive	92,1	74,4	Classically completeness ≥70% for the cognitive, affective, and vocational skill learning outcomes.
Affective	97,4	94,9	
Vocational skill	92,1	100	

Table 3 shows that class IX A achieves the classical completeness for the cognitive, affective, and vocational skill learning outcomes bigger than the determined effective criteria. Class IX D shows the same result as the class IX A. the effectiveness of learning instrument is determined by the level of learning adherence in the broader scale test presented in the Table 4:

Table 4 The result of the level of learning adherence in the broader scale test

The level of learning adherence	Class IX A (%)	Class IX D(%)	Effective Criteria
∑ Students who achieve the level of learning adherence ≥ 61%	100	87,2	≥70% Students who achieve the level of learning adherence ≥ 61%

Table 4 shows that the percentage of the number of the students who achieve the level of learning adherence ≥ 61% either in class IX A or in class IX D also is bigger than the research target achievement. Based on the students' cognitive, affective, and vocational skill learning outcomes and also based on the level of learning adherence in the broader scale test, the students are able to reach the effective criteria which are determined in the research; it means that the learning instrument is implemented effectively in the SMP Empu Tantular Semarang.

Next, the learning instrument product still enters to the final revision before it becomes a final product. The revision is done based on the lack that appear in the broader scale test and the suggestion that comes from the science teacher through the teacher questionnaire toward the learning based life skill. The input from the science teacher comes from the given material. Biotechnology sub material traditionally and modernly is still not balance so the teacher gives suggestions so that the learning process focuses not only on the traditional biotechnology but also modern biotechnology. Therefore, the material presented through the powerpoint media is multiplied with the examples and pictures of the implementation of modern biotechnology such as transgenic food plants.

The final product of this research is the learning instrument including syllabus, lesson plan, worksheet, and assessment instrument of affective and vocational skill. The product passes the feasibility test and effectivity so that it is declared very feasible used and effective to be implemented at SMP Empu Tantular Semarang. The biotechnology learning instrument based on the life skill which is implemented at SMP Empu Tantular Semarang is proven in giving a positive contribution toward the students' learning outcomes. The learning instrument designs the contextual learning approach, which helps the students finding the meaning of their learning by connecting the academic knowledge to their daily life context (Johnson, 2007). The students make an important connections resulting the meaning by doing the soyghurt project that they design, they also have to working together as a team, think creatively, and take part on the assignments authentic assessment.

Contextual approach is one of the learning concept that helps the teacher connecting the material to the real world situation and encourage the students to make a connection between the knowledge that they have and its implementation in their life as a family and society member. The learning outcomes obtained by the students is consider more meaningful for them, because what they have learned is useful for their future life (Irwandi, 2009). The learning outcomes obtained by the students through the developed learning instrument are able to give cognitive competence, affective, and vocational skill which support each other and meaningful so that it can be used for their daily life matter.

Teacher gives a positive response to the biotechnology learning based life skill which id implemented. The developed learning instrument is easy to understand and to used by the teacher. The biotechnology material taught to the students is the material which is needed by them to

be integrated with the vocational skill. The learning activity aimed to provide the students with the vocational skill, knowledge, and positive attitude can be accepted well by the students. they look very enthusiastic in following the learning process.

The product validation which is developed is still simple that is *face validity* using the assessment sheet of feasibility by the experts. The problem is limited on one school that is SMP Empu Tantular Semarang, so the product which is developed cannot be implemented to the other school which have different problem characteristic. The source of study used in this research is not adequate to maximize the potential of local society in Semarang. The raw material of the soyghurt in this research is supposed to use the soy milk raw material produced by the people from the soybean industry directly. Besides soy milk, this industry also produces liquid waste of the soybean processing becoming one of the source of river water pollution. Meanwhile, the making of soyghurt uses not only soy milk raw material, it also can use the liquid waste of soybean processing (Kristanti *et al.* 2012). It shows that this research can be developed further by maximize the people potential through the reuse of the liquid waste of soybean processing which is available to be turned into the food product in order to solve the negative effect for the environment in implementing the biotechnology.

CONCLUSION

Based on this research, it can be concluded that developing the learning instrument based life skill needs to be done because the learning instrument used by the science teacher has not integrated the fully life skill aspects yet. The assessment comes from three experts toward the product which is developed reaches the very feasible criteria with the high reability among the experts. The classical completeness for the learning outcomes covering the cognitive domain, affective, and vocational skill, also the level of learning adherence are able to reach the effectiveness of the target determined in this research, so that the learning instrument that is developed is declared effective to be implemented at SMP Empu Tantular Semarang.

REFERENCES

Chodijah, S., Fauzi, A., & Wulan, R. (2012). Pengembangan Perangkat Pembelajaran Fisika menggunakan Model *Guided Inquiry* yang dilengkapi Penilaian Portofolio pada Materi Gerak Melingkar. *Jurnal Penelitian Pembelajaran Fisika,* 1, 1-19.

[DBE] Decentralized Basic Education 3. (2007). *Modul Pelatihan 2: Integrasi Kecakapan Hidup dalam Pembelajaran*. USAID.

———. (2009. Paket Pelatihan 2: *Pembelajaran Kontekstual dalam Pengembangan Kecakapan Hidup.* USAID.

[Depdiknas] Departemen Pendidikan Nasional. (2007). *Konsep Pengembangan Model Integrasi Kurikulum Pendidikan Kecakapan Hidup*. Jakarta: Depdiknas.

Ghombavani, F. P., Alwi, N. H., Ghadi, I., & Tarmizi, R. A. (2012). Construct Validity Examination of Life Skills For Primary School Students in Iran. *Mediterranean Journal of Social Science*, 3(11).

Haryono, A. (2009). *Authentic Assessment* dan Pembelajaran Inovatif dalam Pengembangan Kemampuan Siswa. *JPE,* 1(1).

Irwandi. (2009). Pengaruh Pendekatan Kontekstual dalam Pembelajaran Biologi melalui Strategi Inkuiri dan Masyarakat Belajar pada Siswa dengan Kemampuan Awal Berbeda terhadap Hasil Belajar Kognitif di SMA Negeri Kota Bengkulu. *Jurnal Kependidikan Triadik,* 12(1)

Jalmo, T. (2008). Penggunaan Pendekatan Keterampilan Proses dalam Upaya Menumbuhkan Kecakapan Hidup Siswa pada Pembelajaran Biologi di Kelas III C SMP Negeri 16 Bandar Lampung Tahun Ajaran 2005/2006. *JPMIPA*, 9(1).

Johnson, E. B. (2007). *Contextual Teaching & Learning: Menjadikan Kegiatan Belajar-Mengajar Mengasyikkan dan Bermakna*. Bandung: Mizan Learning Center (MLC)

Kristanti, E. A., Bintari, S. H., & Ridlo, S. (2012). Pengembangan Perangkat Pembelajaran Bioentrepreneurship Pembuatan Makanan dari Limbah Cair Pengolahan Kedelai. *Journal of Innovative Science Education,* 1(2).

Ngadip. (2009). Konsep dan Jenis Penilaian Autentik (*Authentic Assessment*). *E-Jurnal Dinas Pendidikan Kota* Surabaya, 1,1-13

Purwianingsih, W., Nuryani, Y. R., & Redjeki, S. (2009). Identifikasi Kesulitan Pembelajaran Bioteknologi pada Guru SLTA se-Jawa Barat. *Seminar Nasional : Inovasi Biologi dan Pendidikan Biologi dalam Pengembangan Sumber Daya Manusia*.

Rassool, K. H., & Sharifi, H. P. (2008). Preparation and Compilation of A Life Skills Curiculum for Students in High School Period. *Quarterly Journal of Educational Innovations,* 24.

Sugiyono. (2012). *Metode Penelitan Pendidikan pendekatan kuantitatif, kualitatif dan research & development (R&D)*. Bandung: Alfabeta

Widhy, H. P. (2013). Integrative Science Untuk Mewujudkan 21st Century Skill dalam Pembelajaran IPA SMP. *Seminar Nasional MIPA 2013*.