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THE DEVELOPMENT OF AUDIO-VISUAL STUDENT PORTFOLIOS (LKS) CONTEXTUAL TEACHING AND LEARNING-BASED (CTL) ON SOUND CHAPTER OF SCIENCE SUBJECT FOR DEAF STUDENTS

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ABSTRACT

The results of observation from several SLBs (Special School) showed that there was no LKS that accomodated Audio-Visual. So far, the LKS only available in the form of a handout that could be visualized, so that in science subject, the deaf students had difficulty in understanding sound chapter. In order to help deaf students understood sound chapter, the writer developed Audio-Visual LKS. The general purpose of this study was to develop the Audio-Visual LKS CTL-based on sound chapter of science subject for deaf srudents. The special purposes were (a) to produce Audio-Visual LKS CTL-based, (b) to describe the feasibility of the product of Audio-Visual LKS CTL-based from the experts' valuations as well as the users with the rating instruments available, and (c) the effectiveness of Audio-Visual LKS CTL-based application to the understanding of sound chapter for deaf students at Grade IV. The development procedure used 4-D model which consists of stages of define, design, develop, and disseminate. This study perfomed limited test to five deaf students, and extensive test to 33 deaf students from several SLBs in Surabaya and Yogyakarta. The product resulted from this development was the Audio-Visual LKS CTL-based on sound chapter of science subject with the results of the feasibility from matter experts, media experts, and users that could be categorized as good/proper. The result of effectiveness analysis from all subjects obtained t count (7.510) > t table (1.694). Thus, it can be concluded that there is an effectiveness of application of Audio-Visual LKS CTL-based to the level of sound chapter understanding on science subject for deaf students at Grade IV.

Keywords: Audio-Visual,Contextual Teaching and Learning (CTL), Student's Fortfolios (LKS), Sound Chapter

INTRODUCTION

LKS was a guide in studying especially in test method. According to Arsyad (2004), he said that LKS as a study source could be used as a learning media alternative and was one of print media as a product of the print technology development in the form of books and contain visual materials. Supported by Anggaryani (2006), LKS was a handout that contained lesson materials arranged step by step sistematically and orderly that needed to be understood by the students. Therefore, LKS was a handout which contained guides for students to do some programmed activities and made separately from students' books.

LKS as a lesson material in supporting teaching and learning process (PBM) could be implemented by the deaf students themselves. LKS that was needed in studying science in order to be going well, should be keyed to students' daily lives. Contextual teaching and learning was a learning concept that could help teachers to connect between materials taught with real life situation and encouraged students to connect the knowledges they had with their application in their lives as the members of family and society (Nur-

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hadi, 2002). CTL enabled students to connect the content of academic courses with the context of daily lives to find purposes. CTL expanded students' private context further by means of giving fresh experiences that would stimulate the brains in order to make a new connection to find new purposes (Johmson, 2002).

A book entitled "Phonics Guidance for The Teaching of Phonics to Deaf Children," studied about realising voice/sound and discriminating voice/sound that used surrounding areas (inviting students to take a walk in nearby areas), realising voice/sound and discriminating voice/sound of musical instruments (song or instrument), realising voice/sound and discriminating voice/sound from our own bodies (clap hands), rhythm and voice/sound. According to (SYC Lim, J Simser, 2005: 309), they described that the methods in hearing started from the exercise to detect voice or sound and it emphasized that the teachers would cover their mouths either with their hands or a piece of paper to make students were able to hear it. One of learning approaches that could be used to bridge the discrepancy between the knowledges the students gained with their daily lives was Contextual Teaching and Learning.

Based on the result of the observations from several special schools with fourth grade teachers, there were some obstacles teachers faced when teaching science, one of which was the lack of props. The teachers had difficulty in bringing in the natural sound that akin with the original sound, for example the sound of natures, animals, or musical instruments. That was why the students could not get enough chances to know some sounds which resemble with the original, and also not each basic competencies (KD) were supported by props. Therefore, there some with props and some were not. Without the interesting props, teaching and learning process would also be less interesting. The student were usually very excited and energetic when studying science, because it involved with their daily lives.

In accordance with the thoughts of some figures above and reality, it showed the importance of teachers in preparing lesson materials in the form of Audio-Visual LKS CTL-based on science subject that appropriate with the needs of deaf students. Therefore, the writer had the initiative to develop the Audio-Visual Student Portfolios (LKS) Contextual Teaching and Learning-based (CTL) on sound chapter of science subject for deaf students.

METHODS

This study was a development study because it's purpose was to develop the Audio-Visual LKS CTL-based on sound chapter of science subject for deaf students at Grade IV. It used the 4-D development model as a reference, they were Define, Design, Develop, and Disseminate. The experiment was done in SLB-B Karnnamanohara, Yogyakarta, located on Pandean 2 Street, Gang Wulung Condong, Depok Sub-District, Sleman, Yogyakarta.

The subjects of this study were the deaf students of Grade IV. There were two steps to test the Audio-Visual LKS CTL-based, limited test and extensive test. The limited test used 5 students which consisted of 4 female students and 1 male students with the level of hearing of 90 dB – 110 dB between the age of 10 – 15. Meanwhile the extensive test used 33 students from several SLBs in Surabaya and Yogyakarta. These tests aimed to examine the Audio-Visual LKS CTL-based that was developed. The experiments was held on the second semester of academic year 2016/2017.

The method of collecting data validation of Audio-Visual LKS using Audio-Visual LKS' validation sheet. The validation data of Audio-Visual LKS were collected by validator's valuation used Audio-Visual LKS' validation sheet. The methods of collecting data on Audio-Visual LKS' experiment were: (1) Questionnaire, (2) Test.

The data collected during the experiment would be analysed quantitatively and quantitative descriptively. The research data, matter expert, and media expert were analysed by considering the inputs, comments, and suggestions from the validator. The result of the analysis was used as a reference in revising the Audio-Visual LKS CTL-based. The data of student's and teacher's response which were collected from questionnaire were analysed using descriptive analysis with percentage.

This effectiveness analysis used one group pretest-posttest design. According to Wahyudi, dkk (2014:52) stated that on this design, there was a test before giving treatment (T1) so that the comparison of T1 and T2 to find out the effectiveness of treatment X could be done. If T2 > T1 significantly, it could be concluded that the difference was caused by the treatment (X). The formula to analyse the level of the achievement of effectiveness from overall subjects was **T-Test** statistics formula, from the result data of before and after studying using Audio-Visual LKS CTL-based on science subject sound chapter.

The physical specification of the software was packed in the form of DVD-R with 3,5 GB capacity. For the Audio-Visual LKS, the E-Module science form could be opened using GOM Media File (swf) with 1335 x 750 pixel capacity. There already included Preface, Table of Contents, Introduction, Core Competencies (KI), Basic Competencies (KD), Indicator, Lesson Materials, and also Exercises in accordance with the sound chapter.

The display of the Audio-Visual LKS with the content of lesson materials of sound related to surrounding environment such as nature's sound, pets' sound, vehicles' sound, musical sound, and household appliances' sound.

The software would be displayed a video which consisted of Figures, sounds, and captions that related to some kind of sounds such as nature's sound, pets' sound, vehicles' sound, musical sound, and household appliances' sound. There were objects that could be operated by students or teachers in accordance with their movements.

There was also a navigation button that could repeat the materials presented and useful in interactive question and answer session. The students' answers would be responded directly by the program of the Audio-Visual LKS.

RESULTS AND DISCUSSIONS

The products of this study consisted of two products, they were handout in the form of LKS sheets and Audio-Visual LKS that was packed on CDs that contained several Audio-Visual of Figures and videos CTL-based. The handout of Audio-Visual LKS was clipped with spiral wires on it's edges. This helped deaf students made the Audio-Visual LKS CTL-based more effective (stronger, long-lasting, easy to carry). Meanwhile the Audio-Visual LKS on CDs could be carried out easily so that it made students study easier.

The LKS that was used had different meaning of each colour, for students the colour of the cover was orange (combination of red and yellow) which symbolized happiness, warmth, friendship, optimism. This colour had a strong attractiveness because it could stimulate eyesight (Mangkoko.com. 2016). With the positive-meaning colour, the writer wanted the deaf students to be happy, be optimistic, and also to stimulate students' eyesight so that they could be more focus on Audio-Visual LKS CTL-based.

Physical Aspects of Audio-Visual LKS CTL-based **Audio-Visual LKS CTL-based (for students) :**

Paper type	: HVS
Paper colour	: white
Paper size	: A5
Font	: Tekton
Pages	: 45

The colour of the paper in the LKS was white with green stripes on the sides. White symbolized peace and innocence, while green representated natures, leaves, freshness, relaxation, harmony, natural, cool, soothing (Mangkoko.com. 2016). With positive-meaning colours, the writer hoped that the deaf students would be peaceful in learning Audio-Visual LKS CTL-based.

Audio-Visual LKS CTL-based (for teachers):

Paper type	: HVS
Paper colour	: white
Paper size	: A5
Font	: Tekton
Pages	: 63

The LKS for teachers was blue which symbolized the colour of sky and ocean. It gave a broad impression of a room, freshness, cool, peaceful, and ease of mind (Mangkoko.com. 2016). For the colour of the papers, they were white with blue stripes on the sides. White symbolized peace and innocence.

With the colours that had positive meaning, the writer hoped that the teachers who taught the deaf students would have peaceful souls and at ease minds when teaching deaf students in class (Teaching and Learning Process/PMB)

Accompanying Maerials:
Paper type : HVS
Paper colour : white
Paper size : A5
Font : Tekton
Pages : 11

The CD:
CD type : DVD-R
Capacity : 3,5 GB
Player : GOM Media File
GOM Media File (swf) Capacity : 1335 x 750 pixel

Matter Experts Validation

The results of analysis from the instruments given to the matter experts were used to revise the product of Audio-Visual LKS CTL-based which has been produced to gain the better product of Audio-Visual CTL-based in accordance to the materials studied. The average value of overall indicators was the total amount of value from validator's answers divided with the number of indicators. The total value of matter experts validator's answers was 59. The number of indicators was 14. The average value was 59 : 14 = 4.21. The average value of overall indicators from matter experts' valuation indicated that the Audio-Visual LKS was **good/proper** to be tested.

Media Experts Validation

The results of analysis of the instruments given to the media experts were used to revise the product of Audio-Visual LKS CTL-based which has been produced to gain the better product of Audio-Visual LKS CTL-based in accordance to the materials studied. The average value of overall indicators was the total amount of value from validator's answers divided with the number of indicators. The total value of matter experts validator's answers was 63. The number of indicators was 16. The average value was 63 : 16 = 3.94. The average value of overall indicators from media experts' valuation indicated that the Audio-Visual LKS was **good/proper** to be tested.

Table 1. Validator Valuation of Audio-Visual LKS CTL-based on Science Subject Sound Chapter for Deaf Students.

Result of Validation	Average	Criteria
Matter Experts	4.21	Good
Media Experts	3.94	Good
Total Average	4.08	Good

Table 2. The Criteria of Validator Valuation of Audio-Visual LKS CTL-based on Science Subject Sound Chapter for Deaf Students.

Number	Average Value from Validator	Explanation
1	$1 \leq Va < 1,50$	Bad
2	$1,50 = Va < 2,50$	Poor
3	$2,50 = Va < 3,50$	Fair
4	$3,50 = Va < 4,50$	Good
5	$4,50 = Va < 5,0$	Excellent

Explanation:
Va = the level of validity

The test of Audio-Visual LKS CTL-based was done in Grade IV Class. The Audio-Visual LKS CTL-based was tested to students with hearing disorders in SLB-B Karnnamanohara Yogyakarta which amounts to five students at the ages of 10-15 years and the level of hearing of mild and moderate between 90dB – 110 dB. The experiment was done to test the feasibility of Audio-Visual LKS CTL-based on sound chapter of science subject. The test was done three times. At the end of the test, the questionnaires of student responses were distributed to students to be filled.

After each teaching and learning activity using Audio-Visual LKS CTL-based, the five deaf students were given questionnaires about their opinions about the using of Audio-Visual LKS CTL-based. The average students response for the third meeting was 96.83%. According to the percentage of student response on meeting I, II, and III which gave positive response to the Audio-Visual CTL-based, it could be concluded that the Audio-Visual LKS CTL-based was **proper** to use.

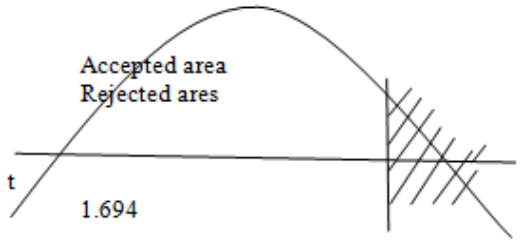
The questionnaires of teacher response about Audio-Visual LKS CTL-based aimed to get the input from teachers about the Audio-Visual LKS CTL-based that was used. The teacher response of the using of Audio-Visual LKS CTL-based were answered after they used the LKS on each meeting. The average of teacher response on meeting I, II, and III was 96.30%. Based on the value range, it could be said that the teacher response about Audio-Visual LKS CTL-based was **positive**. Because of the said response, it could be concluded that the Audio-Visual LKS CTL-based was **proper** to use.

The formula to analise the level of achievement of effectiveness from overall subjects was statistical formula of **T-Test**, from the test result data before and after studying using Audio-Visual LKS CTL-based on sound chapter of science

subject. The **T-Test** formula was as follows (Djarwanto, 2000:158):

$$t = \frac{\overline{d}}{S_{d/\sqrt{n}}}$$

$H_0 : {}_{2=1}\ or\ {}_{d} = 0\ (=0)$
$H_1 : {}_{2} > {}_{1}\ or\ {}_{d} > 0\ (>0)$
Value of $t_{0.05;32} = 1.645$
H_o accepted if: $t \leq 1.645$
H_o rejected if: $t > 1.645$



$$t = \frac{\overline{d}}{S_{d/\sqrt{n}}}$$

= 7.510

Because the degree of freedom was not included on the table, the writer then interpolated to get the value of t-table.

t count (7.510) > t table (1.694), H_o rejected. It could be concluded that there was an effectiveness viewed by the level of understanding sound chapter for deaf students Grade IV using Audio-Visual Student Portfolios (LKS) Contextual Teaching and Learning-Based (CTL) on Science Subject.

CONCLUSION

There are two products of this study, they are handout in the form of LKS sheets and Audio-Visual LKS in the form of CD that contains some Audio-Visuals such as Figures and videos CTL-based.

The product of Audio-Visual LKS has been declared as proper by matter experts, media experts, and users (teachers and students)

The effectiveness can be viewed from the level of understanding of sound chapter for deaf students at Grade IV using Audio-Visual Student Portfolios (LKS) Contextual Teaching and Learning-based (CTL) on science subject.

REFERENCE

Akhyar & Musta'in. (1991). *Pengembangan dan Inovasi Kurikulum*. Jakarta: PT Gramedia.

Amri, Sofan. (2013). *Pengembangan & Model Pembelajaran dalam Kurikulum 2013*. Jakarta: PT. Prestasi Pustakaraya.

Anggaryani, M. (2006). *Pengembangan LKS Pelajaran IPA yang Disesuaikan dengan KBK pada Pokok Bahasan Pesawat Sederhana untuk Siswa Kelas VII. Tesis Megister Pendidikan.* Universitas Negeri Surabaya.

Anonimus. (2002). *Pendekatan Kontekstual (Contextual Teaching and Learning)*. Depdiknas. Jakarta.

Arif, Zainuddin & W.P Napitupulu. (1997). *Pedoman Baru Menyusun Bahan Belajar.* Jakarta: PT Gramedia Widiasarana Indonesia.

Arsyad, Azhar. (2002). *Media Pembelajaran.* Jakarta : PT. Raja Grafindo Persada.

Arsyad, Azhar. (2011). *Media Pembelajaran*. Jakarta: Raja Grafindo Persada.

BSNP. (2006). *Standar Isi untuk Satuan Pendidikan Dasar dan Menengah*. Jakarta: BSNP.

Budiyanto., Praptono., Yusuf, Munawir., Supena, Asep., Sujarwanto, Ahmad, Asep., Rakhmita, Tita., Tim MCPM-AIBEP. (2010). *Modul Pelatihan Pendidikan Inklusi.* Jakarta: Kementerian Pendidikan Nasional.

Buku Guru, Tema 4. (2014). *Keselamatan di Rumah dan Perjalanan.*. Jakarta: Kemendikbud.

Buku Siswa, Tema 4. (2014). *Keselamatan di Rumah dan Perjalanan*. Jakarta: Kemendikbud.

Damayanti, Puti. (2010). *IPA Alam Sekitar Kita SD Kelas IV, 4A*. Penerbit: Yudistira.

Darmodjo, Hendro & Jenny R.E Kaligis. (1992). *Pendidikan IPA*. Proyek Pembinaan Tenaga Kependidikan Direktorat Jenderal Pendidikan Tinggi Departemen Pendidikan dan Kebudayaan.

Daryanto. (2003). *Fisika Teknik*. Jakarta: Rineka Cipta.

Depdiknas. (2006). *Peraturan Menteri Pendidikan Nasional No 22, 23, dan 24 Tahun 2006.* Jakarta : Sinar Grafika.

Depdiknas. 2006. *Undang-undang Republik Indonesia Nomor 14 Tahun 2005 Tentang Guru dan Dosen.* Jakarta : Sinar Grafika.

Direktorat. (2014). *Kompetensi Inti dan Kompetensi Dasar Pendidikan Khusus*. Jakarta: PKLK Pendidikan Dasar Kemdikbud.

Djamarah, Syaiful Bahri & Aswan Zain. (2002). *Strategi Belajar Mengajar*. Jakarta: Rineka Cipta.

Djatun, R. (1999). *Rangkuman Statistik I dan Rangkuman Statistik II* untuk Kalangan Sendiri.

Djarwanto. (2000). *Soal-Jawab Statistik Bagian Statistik Induktif*. Yogyakarta: Liberty.

DU.KU/edukasi.net. (2008). *SMA/Biologi/Sistem.Indera.Manusia/materi4.html*. Diakses, 1 Januari 2016 (20:00).

Effendi, Mohammad. (2006). *Pengantar Psikopedagogik Anak Berkelainan*. Jakarta: Bumi Aksara.

Egelston, Judy-Dodd & Simon Ting. (2007). *Journal of Science Education for Students with Disabilities* Vol. 12, No. 1. Winter, 2007 *"Video-Tutorials for*

Tech Sign Vocabulary in Astronomy".

Erryanti, M.R & Poedjiastoeti, S. (2013). *Lembar Kerja Siswa (LKS) Berorientasi Keterampilan Proses Materi Zat Aditif Makanan untuk Siswa Tunarungu SMALB-B.* UNESA Journal of Chemical Education, 2 (1): 51-58.

Gay, L.R. (1991). *Educational Evaluation and Measurement: Com- petencies* for Analysis and Application. Second edition. New York: Macmillan Publishing Compan.

Giancoli, Douglass. (1999). *Fisika Edisi Kelima 1.* Jakarta: Erlangga.

Glencoe. (1997). *Physical Science for Teacher*. America.

Glencoe. (1997). *Physical Science Manual*. America.

Hamalik, Oemar. (2004).*Proses Belajar Mengajar*. Jakarta: Bumi Aksara.

Hayat, B. & Yusuf, S. (2010). *Benchmark Internasional: Mutu Pendidikan*. Jakarta: Bumi Aksara.

Ibrahin, M. (2002). *Pengembangan Perangkat Pembelajaran*. Modul disajikan pada pelatihan terintegrasi berbasis kompetensi guru mata pelajaran biologi SLTP. Jakarta: Dirjen Diksasmen Depdiknas.

Isnaningsih & D.S. Bimo. (2013). *Penerapan Lembar Kegiatan Siswa (LKS) Discovery Berorientasi Keterampilan Proses Sains Untuk Meningkatkan Hasil Belajar IPA*.

Johnson, E.B. (2002). *Contextual Teaching and Learning.* California: Corwin Press, Inc.

Komalasari, K. (2010). *Pembelajaran Kontekstual Konsep dan Aplikasi.* Bandung: Refika Aditama.

Kurniawati, Nora & Khusnul Khotimah. (2013). *Jurnal Teknologi Pendidikan*: *Pengembangan Media Video Pembelajaran untuk Mata Pelajaran IPA Perubahan Kenampakan Muka Bumi dan Benda Langit bagi Siswa Kelas IV SDD Muhammaddiyah 15 Surabaya.* Surabaya: Universitas Negeri Surabaya.

Lee, C.M. (2010). *Middle School Deaf Students Problem Solving Behaviors and Strategy Use* (Unpublished master's thesis). The Ohio State University.

Lim, SYC & J Simser. (2005). *Auditory-Verbal Therapy for Children with Hearing Impairment*. Singapore.

Ling, Daniel. (1988). *Foundations of Spoken Language For Hearing Impaired Children*. The Alexander g. Bell Ass. Foer the Deaf Inc, 3417 Volta Place, N.W. Washington D.C. 29917-2778.

Mintohari & Julianto. (2009). *Ilmu Pengetahuan Alam Sekolah Dasar*. Surabaya: Unesa University Press.

Mulyasa, E. (2006). *Kurikulum Tingkat Satuan Pendidikan (KTSP)*. Bandung: Rosdakarya.

Munir. (2013). *Multimedia konsep dan Aplikasi dalam Pendidikan*. Bandung : Alfabeta

Nurhadi. (2002). *Pembelajaran Kontekstual dan Penerapannya dalam KBK*. Malang: Universitas Negeri Malang.

Periago, Cristina., Pejuan, Arcadi., Jaen, Xavier. And Bohigas, Xavier. (2009). *Misconception About The Propagation of Sound Wave*. Dept. de Fis. i Eng., Univ. Politec. de Catalunya, Barcelona, Spain.

Pinto-Silva, F. Martins, P. Rumjanek, V. (2013). *Rousing Interest in Science Among Secondary School Deaf Student. Scholarly Journal of Scientific* Research and Essay. Vol. 2 (7).pp. 104-108.

Poedjiastoeti, Sri. (2012). *Jurnal:Kit Kimia dengan Strategi Writing-to-Learn untuk Siswa SMALB Tunarungu.* Surabaya: Prosiding Seminar Nasional Kimia Universitas Negeri Surabaya.

Prabawati, Emy. (2015). *Korelasi Antara Adversity Qoutient dan Motif Berprestasi dengan Hasil Belajar IPA Siswa Sekolah Menengah Pertama Luar Biasa Bagian B(SMPLB-B) Di Bali*. Thesis: Universitas Negeri Surabaya.

Prastowo, Andi. (2013a). *Panduan Kreatif Membuat Bahan Ajar Inovatif*. Yogyakarta: Diva Press.

Prastowo, Andi. (2013b). *Pengembangan Bahan Ajar Tematik*. Yogyakarta: Diva Press.

Purwaningsih, Dwi Ratna, & Dwi Sulisworo. (2015). *Jurnal:Pengembangan LKS Bagi Anak Berkebutuhan Khusus (ATR) SMK Kelas X Pokok Bahasan Suhu dan Termometer*. Prosiding Pertemuan Ilmiah XXIX HFI Jateng & DIY. Yogyakarta.

Putra, S.R. (2013). *Desain Belajar Mengajar Kreatif Bebasis Sains*. Yogyakarta: Diva Press.

Relawati, Tian. (2003). *Materi Pokok Pengembangan Bahan Ajar Edisi ke I*. Jakarta: Universitas Terbuka . h.1-3.

Retnowati, Rahayu Dwisiwi Sri. (2010). *Jurnal:Pengembangan Media Pembelajaran Materi Bunyi untuk Siswa Tunarungu di SMALB*. Yogyakarta: UNY Fisika FMIPA.

Riduwan. (2012). *Skala Pengukuran Variabel-variabel Penelitian*. Bandung: Alfabet.

Rima, putri. (2015). *Teori-belajar-john-dewey.html.* Diakses, 6 Juni 2016 (23.00).

Ririn, Endah Purnamasari, dan Poedjiastoeti, Sri. (2013). *Kelayakan LKS Eksperimen Berorientasi Keterampilan Proses pada Materi Bahan Aditif Makanan untuk Siswa Tunarungu. Unesa Journal of Chemical Education Vol 2, No. 1, pp. 11-20 Januari 2013.*

Sadiman, Arief. (2014). *Media Pendidikan: Pengertian Pengembangan dan Pemanfaatannya*. Jakarta: Raja Grafindo Persada.

Sadiman, Arief. (2009). *Media Pendidikan, Pengertian, Pengembangan, dan Pemanfaatannya*. Jakarta: Rajawali Press.

Saktiyono. (2007). *IPA Biologi SMP & Mts Jilid untuk kelas VII*. Jakarta: Erlangga.

Samatowa, Usman. (2011). *Pembelajaran IPA di Sekolah Dasar.* Jakarta: Indeks.

Sardjono. (2000). *Orthopaedagogik Anak Tuna Rungu*. Surakarta: UNS Press.

Sa'ud, U.S. (2008). *Inovasi Pendidikan*. Bandung: Alfabeta.

Seel, B. & Richey, R.C. (1994). *Teknologi Pembelajaran Definisi dan Kawasannya*. Washington, DC: Association for Educational Communications and Technology.

Shoimin, Aris. (2013). *Excellent Teacher Meningkatkan Profesionalisme Guru Pasca Sertifikasi*. Semarang: Dahara Prize.

Silaban, Pantur & Sucipto, Erwin. (1977). *Fisika*. Jakarta. Erlangga.

Slavin, Robert E. (1994). *Educational Psychology Theori Into Practices Fourt Edition.* Boston: Allyn and Bacon Publishers.

Smart, Aqila. (2010). *Anak Cacat Bukan Kiamat*. Yogyakarta: Kata Hati.

Society, American Chemical. (2011). *Middle School Chemistry Part 3*.

Soejadi, Peter. (2002). *Fisika Dasar*. Yogyakarta: Andi Offset.

Soekamto, Toeti & Udin S. Winataputra. (1995). *Teori Belajar dan Model-Model Pembelajaran*. Jakarta: Ditjen Dikti, Depdiknas.

Subana. (2000). *Statistik Pendidikan*. Bandung: Pustaka Setia.

Sudjana, Nana. (2013). *Penilaian Hasil Proses Belajar Mengajar*. Bandung: PT. Remaja Rosdakarya.

Sugihartono. (2007). *Psikologi Pendidikan*. Yogyakarta: UNY Press.

Sugiyono. (2009). *Metode Penelitian Pendidikan*. Bandung: penerbit Alfabeta.

Suharmini, Tin. (2009). *Psikologi Anak Berkebutuhan Khusus*. Yogyakarta: Kanwa Publisher.

Sukiman. (2012). *Pengembangan Media Pembelajaran*. Yogyakarta: Pustaka Insan Madani.

Suparno, P. (2001). *Teori Perkembangan Kognitif Jean Piaget*. Yogyakarta: Konisus.

Suroso, Mukti Leksono. (2010). *Pengembangan Media Pembelajaran Berbantuan Komputer untuk Materi Amfibi.*

Thiagarajan, S., Semmel, D.S., & Semmel, M.I. (1974). *Instructional Development for Training Teacher of Exeptional Children, a Sourcebook*. Bloomington Center for Innovation on Teaching the Handicapped. Indian: Indian University.

Thiagarajan, Hemalatha. *Interaktive Multimedia Tool to Help Vocabulary Learning of Hearing Impaired Children by Using 3D VR Objects as Visual Cues. Collage Of Engg & Tecnology, Pollachi, South India.*

Tim Pascasarjana. (2015). *Pedoman Penulisan Tesis dan Disertasi*. Surabaya: Universitas Negeri Surabaya.

Tippler, Paul. (1998). *Fisika untuk Sains dan Teknik*. Jakarta: Erlangga.

Trianto. (2008). *Mendesain Pembelajaran Kontekstual (Contextual Teaching and Learning) di Kelas.* Jakarta: Cerdas Pustaka Publisher.

Wahyudi, Ari & Sujarwanto. (2014). *Metodologi Penelitian Pendidikan.* Surabaya: Unesa University Press.

Wasis. (2006). *Contextual Teaching and Learning (CTL) dalam Pembelajaran Sains-Fisika SMP*. Cakrawala Pendidikan, Februari 2006, Th. XXV, No.1.

Widoyoko, Eko Puro. (2012). *Teknik Penyusunan Instrumen Penelitian*. Yogyakarta: Pustaka Pelajar.

Winarsih, Murni. (2007). *Intervensi Dini Bagi Anak Tunarungu dalam Pemerolehan Bahasa*. Jakarta: Dikti.

Wisudawati, Asih Widi & Sulistyowati, Eka. (2015). *Metodologi Pembelajaran IPA*. Jakarta: Bumi Aksara.

Yamin, Martinis.(2013). *Strategi dan Metode dalam Model Inovasi Pembelajaran*. Jakarta : Gaung Persada Press group

Zemansky, Seans. (1982). *Fisika untuk Universitas 1*: Mekanisme, Panas, Bunyi. Jakarta: Bina Cipta.