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## TREND OF RESEARCH ON PHYSICS LEARNING MEDIA AND ITS FINDINGS

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### ABSTRACT

This paper purpose to describe the more research results of physics learning media and its application. The study methods collect many research result of learning media that was published in national or international level by journal or conference proceeding. The study does result show about 30% media learning topics of the published papers. More papers develop to physics learning media and the effect test of its application to physics competence of students. The conclusion is that research trend of physics learning media still develop and its effect test. The suggestion is support to make the database of physics learning media specially.

Keyword: trend, research, physics, learning, media

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### INTRODUCTION

Learning Media is a discussion that is widely studied and developed. Learning media as described in the literature, such as in the books by Arief Sadiman, covers a large number of scopes, including 2-dimensional images media, three-dimensional media, audio-visual media, and multimedia (Sadiman, 2009). In line with this, the results of research publications in seminars, both national and international levels, organized by science departments in the universities in Central Java and Yogyakarta Special Region indicates that there is always research publication on instructional media.

Not by chance, one of the authors is also very interested in the field of analysis and development of instructional media, both in his daily studies as well as in his works in completing his master and doctoral studies. Some of these work have been published in journals, proceedings of seminars and books. Seeing these developments, the authors want to examine what have been developed and studied in those publications about the instructional media.

This paper is aimed at describing research results of physics learning media and its application.

Media learning that has been developed and discussed, as well as the concentration of discussion in terms of design development, test effectiveness are interesting to discuss. This paper will discuss the findings of the studies in instructional media.

### METHODS

This study is a literature review of various sources of publication. The study will collect various research results of learning media that have been published in national or international levels. The publication are taken from one journal, 5 proceedings of a national seminar and 1 proceedings of an international seminar organized by universities in Central Java province and Yogyakarta Special Region during the period of 2004 to 2015.

### RESULTS AND DISCUSSION

The results of the studies on learning media from various journals, proceedings of national and international seminars are presented in Table 1.

**Table 1.** Data of publications in a journal and proceedings of national and international seminars on instructional media

No	Source's Name	All	Page	Original Chapter	Scope of Discussion	%	Categories of products / utilization		
							Animation	Props	Utilization
1	Prosiding Seminar ALFA IV	3	309-312	Pengembangan Media Pembelajaran Fisika Berbasis Komputer menggunakan Komik Animasi untuk Siswa SMP	Developing computer-based physics instructional media using an animated comic already used to support Physics learning at SMP (secondary schools).	33.3	1		
2	Prosiding 2nd ICRIEMS	10	PE.1-PE.8	Development of Virtual Laboratory Hypermedia Based on Atomic Physics at SMAN 1 Pinrang	Developing Atomic Physics animation for virtual laboratory	30.0	1		
3			PE.47 - PE.54	Analysis The Motion of Object Under The Gravitational Influence of The Earth	Using cameras and computers media to study the motion of falling objects with and without air resistance			1	
4			PE.67 - PE.73	Theoretical Review: The Observation for Thinking Process by Piaget's Theory Through Media Learning Physics's Animation	Developing thought process indicator based on Piaget's theory to analyze the thought process in using instructional media				1
5	Prosiding Seminar Nasional UNY	31	PF.1-PF.6	Pemanfaatan Peralatan Praktikum Fisika Dasar untuk Demonstrasi Kelas Pada Makul Mekanika Guna Meningkatkan Motivasi dan Daya Serap Mahasiswa	Usingpracticum equipments/ demonstration in the form of swing torque tool for material tune vibration, rotating seat for momentum conservation material, the wheels stemmed Electric Turn-Table for rotating reference frame material	22.6			1

6	PF.7- PF.13	Modifikasi Suatu Alat Agar Dapat Dipergunakan Sebagai Alat Demonstrasi atau Alat Eksperimen Fisika di Sekolah Menengah	Designing OHP instructional media OHP for demonstration of magnetic field lines, demonstration of the use of calipers, vernier scale reading Nonius term, the ripple tank; Balance arm for a demonstration tool compressive force to the top of archimedes, experimental device determines the density of solids, experimental device determines the density of the liquid, experimental device determines the repulsion of two electric current carrying straight wire; Airpump Melde aquarium for tool vibration; Laser Pointer for experiments determine the refractive index of the liquid; Digital stopwatch for the timekeeper free fall motion and motion of objects on the incline; Cars / trains toys for timer ticker tape drive level junior high school students.	1
7	PF.89- PF.95	Pemahaman Konsep Siswa setelah Menggunakan Media Pembelajaran Animasi Fisika yang Tidak Sesuai Fisika	Using the wrong learning media can plunge the students to have a wrong understanding	1
8	PF.97- PF.10 4	Pengembangan Peralatan dan Alat Evaluasi Praktikum pada Matakuliah Elektronika Dasar	Developing matrix board panels and matrix board components for basic electronics lab	1
9	PF.11 9- PF.12 5	Memfaatkan Limbah Lampu Listrik untuk Media Pembelajaran Paikem mata Pelajaran Fisika SMA	Designing U pipes from used SL energy saving lamps for 'jenis cairan' measurement practicum	1
10	PF.12 7- PF.13 4	Kelayakan Percobaan Susunan Seri- Paralel Sumber Tegangan Listrik Batu Baterai berbasis Voice Equipment untuk Siswa Penyandang Tunanetra	Designing lab equipment on series-parallel arrangement for the blinds	1

11			PF.17 5- PF.19 0	Penanaman Konsep Hukum Lenz Berbasis Laboratorium melalui Metode Sungsang	Using props magnets, coils, ampermeter to instill the concept of Lenz's law with Sungsang's methods		1
12	Prosiding Seminar Nasional Sains dan Pendidikan Sains	19	436- 440	Peningkatan Kualitas Perkuliahan Fisika Keperawatan Melalui Model Pengajaran Langsung dengan menggunakan Multimedia	Using multimedia in physics lectures	26.3	1
13			441- 452	Pemanfaatan Kamera Digital dan Komputer sebagai Media Pembelajaran Ayunan Bandul Sederhana dan Ujicoba Keberhasilannya	Using digital cameras, commuter, and props pendulum swinging to analyze graphs, period, amplitude and speed of movement of the pendulum		1
14			453- 464	Pengembangan Alat Peraga Sederhana Sebagai Media Pembelajaran Kontekstual Topik Alarm Banjir dan Ujicoba Keberhasilannya	Using bottles, corks, wires, batteries to create an open and closed circuit for flood alarm applications		1
15			465- 476	Pengaruh Pembelajaran Fisika Menggunakan Lab Virtual Terhadap Prestasi Belajar Ditinjau dari Kemampuan Awal Siswa	Using computer animation as a virtual lab		1
16			485- 489	Peningkatan Hasil Belajar IPA Menggunakan Media Alat Peraga Siswa Kelas V SD	Using science props for elementary students		1
17	Prosiding Seminar Nasional UNY	49	F.270- F.278	Visual Basic dan Desain Animasi Fisika	The formulation of signs in making a physics-based Visual Basic computer animation	10.2	1
18			F.305- F.311	Penggunaan Media Animasi Simulasi Komputer dan Modul LKS	Utilizing animated computer simulations in physics learning		1

				ditinjau dari Motivasi Berprestasi dan Kemampuan Awal Siswa						
19			F.334- F.341	Pengembangan Model Program Pengajaran Berbantuan Komputer untuk Remediasi dalam Perkuliahan Fisika Dasar I	Developing Basic Physics 1 animations by using a computer		1			
20			F.474- F.482	Rekonstruksi Perangkat Praktikum Fisika Dasar II untuk Menunjang Perkuliahan Fisika Dasar II di FMIPA UNESA	The development of lab book			1		
21			F.483-	Vibration Interferometry, Alternatif Pendeteksi Gempa	Designing Michelson-Morley Interferometer for vibration detection learning media		1			
22	Jurnal Widya Sari	15	43-58	Mendukung Komik Sebagai Media Pembelajaran Fisika	Utilizing General and specific comic in learning Physics	6.7	1			
23	Prosiding Seminar Nasional UAD	12	13-19	Sebuah Kritik : Animasi Fisika yang Tidak Sesuai Fisika	The analysis of conceptual errors in Physics animation learning media	25.0		1		
24			20-26	Perancangan Media Pembelajaran Fisika tentang Suhu dan Kalor berbasis Website Tanpa Jaringan dengan Menggunakan MS Word 2003	Using MS Word for physics learning media		1			
25			i86-	Penentuan Momen Kelembaman Silinder Pejal Dengan Percobaan Bidang Miring	Utilizing "bidang miring" lab equipment for learning Ductile moment of inertia Cylinder			1		
							Amount	7	11	7
							Percentage (%)	28.0	44.0	28.0

Table 1 shows that there are a total of 25 publications on the learning media. 7 publications (28%) are on the design and development of instructional media such as computer animation, 11 publications (44%) are on the development of learning media in the form of

props, and 7 publications (28 %) are on the use and measurement of the impact of using these learning media. From the study, it appears that 18 publications (72%) are about the development of learning media. This shows that the interest of the researchers to develop new

learning media is still high. The high interest of these researchers in creating new learning media (about 30%) has not been studied further whether because of dissatisfaction with the existing learning media, not knowing that the intended media have actually been existed, or whether they think that the use of the existing instructional media developed by other people are less attractive to be used as research.

The details of the discussion of the results of the studies in Table based on product categories or usage are as follows:

1. Learning media in the form of animation products:

- a. computer-based physics learning media using animated comic that has been applied to the Physics learning at SMP levels (Andiyana and Muchlas, 2015)
- b. Atomic Physics animation for virtual laboratory (Swandi et.al., 2015)
- c. multimedia in Nursing Physics lectures (Asnawi, 2010)
- d. computer animation as virtual laboratory (Rohmadi, 2010)
- e. Physics using computer animation (Hardiati et al, 2010)
- f. Basic Physics 1 animations using computers (Jumadi, 2004)
- g. Using Microsoft Word for physics learning media (Setyadi and Oktova, 2008)

2. Learning media in the form of props products:

- a. cameras and computers media to study the motion of falling objects with and without air resistance (Jarawae et.al, 2015)
- b. Using OHP for demonstrating magnetic field lines, demonstrating the use of calipers, vernier scale reading Nonius term, the ripple tank; Balance arm for a demonstration tool compressive force to the top of archimedes, experimental device determines the density of solids, experimental device determines the density of the liquid, experimental device determines the repulsion of two electric current carrying straight wire; Airpump Melde aquarium for tool vibration; Laser Pointer for experiments determine the refractive index of the liquid; Digital stopwatch for the timekeeper free fall motion and motion of objects on the incline; Cars / trains toys for timer ticker tape drive level junior high school students (Purwanto, 2009)
- c. matrix board panels and matrix board component for basic electronics practicum (Supriono, 2009)
- d. U pipes from used Energy Saving Lamps (SL) for measuring the density of the liquid (Wahyudi, 2009)
- e. Practicum equipments of parallel arrangement for the blinds (Astono, 2009).

- f. Science props for elementary school students (Latifah et al, 2010)
- g. Michelson-Morley interferometer as learning media for detecting vibration / quake (Kristiyanto, 2004)
- h. General and specific comic props in teaching Physics (Kusyanti and Kristiyanto, 2009)
- i. "Bidang miring" practicum equipment for learning the incline moment of inertia solid cylinder (Setyadi and Oktova, 2008)

3. the utilization of instructional media:

- a. thought process indicators based on Piaget's theory to analyze the thought process in the use of instructional media (Kristiyanto et.al., 2015)
- b. the effectiveness toward the increase of student motivation and absorption through the utilization of practicum tool and demonstration in the form of swing torque tool for material tune vibration, rotating seat for the material conservation of momentum, the wheels stemmed Electric Turn-Table for material rotating reference frame (Widiatmono and Partini, 2009)
- c. the effectiveness of concept understanding through the use of props on magnets, coils, ammeters discussed with Sungsang's method (Kristiyanto, 2009)
- d. the formulation signs Physics-based computer animation creation through Microsoft Visual Basic program (Kristiyanto, 2004)
- e. the development of lab book through reconstruction of the equipments in basic physics II lab to support the lectures of Physics II (Suliyannah, 2004)
- f. the analysis of conceptual errors in physics animation learning media (Kristiyanto, 2008)

Interesting things that can be drawn from this study is that some researchers have focused in developing learning media in the form of props and computer. These are in the forms of virtual labs and multimedia, and there are studies on conceptual errors in the circulating instructional media. Moreover, there is also a study on the use of OHP, which has been found appropriate for particular experiments. The results of those studies show that the topics on learning media are about 30%. Other papers show the development of learning physics test media and the effect of its application to the physics competence of students.

## **CONCLUSION**

The conclusion is that the research trend of physics is still on the development of learning media and its effect. There are 28% of research produce instructional media such as props, 44% in the form of computer animation, and 28% do not produce

instructional media but utilize existing instructional media. The suggestion is to support the development of the database of physics-specific learning media. In addition it may be interesting also for further research to investigate the reasons of the researchers to produce new instructional media that may already exist.

## REFERENCES

- Andiyana, Muchlas. 2015. *Pengembangan Media Pembelajaran Fisika Berbasis Komputer menggunakan Komik Animasi untuk Siswa SMP*. Yogyakarta : Prosiding Seminar ALFA IV Universitas Negeri Yogyakarta
- Asnawi. 2010. Peningkatan Kualitas Perkuliahan Fisika Keperawatan Melalui Model Pengajaran Langsung dengan Menggunakan Multimedia. Salatiga : Prosiding Seminar Nasional Sains dan Pendidikan Sains FSM Universitas Kristen Satya Wacana
- Astono, J. 2009. Kelayakan Percobaan Susunan Seri-Paralel Sumber Tegangan Listrik Batu Baterai berbasis Voice Equipment untuk Siswa Penyandang Tunanetra. Yogyakarta: Prosiding Seminar Nasional Penelitian, Pendidikan dan Penerapan MIPA FMIPA Universitas Negeri Yogyakarta
- Hardiati, N., Suparmi, Cari., Sunarno, W. 2004. Penggunaan Media Animasi Simulasi Komputer dan Modul LKS ditinjau dari Motivasi Berprestasi dan Kemampuan Awal Siswa. Yogyakarta : Prosiding Seminar Nasional Penelitian, Pendidikan dan Penerapan MIPA FMIPA Universitas Negeri Yogyakarta
- Jarawae, R., Reera, N., Bornoh, N. 2015. Analysis The Motion of Object Under The Gravitational Influence of The Earth. Yogyakarta : Proceeding of The 2<sup>nd</sup> International Conference on Research, Implementation and Education of Mathematics and Science Yogyakarta State University
- Jumadi. 2004. Pengembangan Model Program Pengajaran Berbantuan Komputer untuk Remediasi dalam Perkuliahan Fisika Dasar I. Yogyakarta : Prosiding Seminar Nasional Penelitian, Pendidikan dan Penerapan MIPA FMIPA Universitas Negeri Yogyakarta
- Kobi, A.A., Trihandaru, S. 2010. Pemanfaatan Kamera Digital dan Komputer sebagai Media Pembelajaran Ayunan Bandul Sederhana dan Ujicoba Keberhasilannya. Salatiga : Prosiding Seminar Nasional Sains dan Pendidikan Sains FSM Universitas Kristen Satya Wacana
- Kristiyanto, W.H. 2004a. Visual Basic dan Desain Animasi Fisika. Yogyakarta : Prosiding Seminar Nasional Penelitian, Pendidikan dan Penerapan MIPA FMIPA Universitas Negeri Yogyakarta.
- Kristiyanto, W.H. 2004b. Vibration Interferometry, Alternatif Pendeteksi Gempa. Yogyakarta : Prosiding Seminar Nasional Penelitian, Pendidikan dan Penerapan MIPA FMIPA Universitas Negeri Yogyakarta
- Kristiyanto, W.H. 2008. Sebuah Kritik : Animasi Fisika yang Tidak Sesuai Fisika. Yogyakarta : Prosiding Seminar Nasional Fisika, Pembelajaran dan Aplikasinya Pascasarjana Universitas Ahmad Dahlan
- Kristiyanto, W.H. 2009. Penanaman Konsep Hukum Lenz berbasis Laboratorium melalui Metode Sungsang. Yogyakarta: Prosiding Seminar Nasional Penelitian, Pendidikan dan Penerapan MIPA FMIPA Universitas Negeri Yogyakarta
- Kristiyanto, W.H., Prabowo, Kardi, S. 2015. Theoretical Review : The Observation for Thinking Process by Piaget's Theory Through Media Learning Physics's Animation. Yogyakarta : Proceeding of The 2<sup>nd</sup> International Conference on Research, Implementation and Education of Mathematics and Science Yogyakarta State University
- Kusyanti, R.N.T. 2009. Pemahaman Konsep Siswa setelah Menggunakan Media Pembelajaran Animasi Fisika yang Tidak Sesuai Fisika. Yogyakarta: Prosiding Seminar Nasional Penelitian, Pendidikan dan Penerapan MIPA FMIPA Universitas Negeri Yogyakarta
- Kusyanti, R.N.T., Kristiyanto, W.H. 2009. Mendukung Komik Sebagai Media Pembelajaran Fisika. Salatiga: Jurnal Widya Sari
- Langtang, D., Kristiyanto, W.H. 2010. Pengembangan Alat Peraga Sederhana sebagai Media Pembelajaran Kontekstual topic Alarm Banjir dan Ujicoba Keberhasilannya. Salatiga : Prosiding Seminar Nasional Sains dan Pendidikan Sains FSM Universitas Kristen Satya Wacana
- Latifah, S., Fatmaryanti, S.D., Akhdinirwanto, R.W. 2010. Peningkatan Hasil Belajar IPA Menggunakan Media Alat Peraga Siswa Kelas V SD. Salatiga : Prosiding Seminar Nasional Sains dan Pendidikan Sains FSM Universitas Kristen Satya Wacana

- Purwanto, B. 2009. Modifikasi Suatu Alat Agar dapat Dipergunakan sebagai Alat Demonstrasi atau Alat Eksperimen Fisika di Sekolah Menengah. Yogyakarta: Prosiding Seminar Nasional Penelitian, Pendidikan dan Penerapan MIPA FMIPA Universitas Negeri Yogyakarta
- Rohmadi, N. 2010. Pengaruh Pembelajaran Fisika Menggunakan Lab Virtual terhadap Prestasi Belajar ditinjau dari Kemampuan Awal Siswa. Salatiga : Prosiding Seminar Nasional Sains dan Pendidikan Sains FSM Universitas Kristen Satya Wacana
- Sadiman, A. 2009. Media Pendidikan : Pengertian, Pengembangan dan Pemanfaatannya. Jakarta : Rajawali Press.
- Setyadi, E., Oktova, R. 2008a. Perancangan Media Pembelajaran Fisika tentang Suhu dan Kalor berbasis Website Tanpa Jaringan dengan Menggunakan MS Word 2003. Yogyakarta : Prosiding Seminar Nasional Fisika, Pembelajaran dan Aplikasinya Pascasarjana Universitas Ahmad Dahlan
- Setyadi, E., Oktova, R. 2008b. Penentuan Momen Kelembaman Silinder Pejal dengan Percobaan Bidang Miring. Yogyakarta : Prosiding Seminar Nasional Fisika, Pembelajaran dan Aplikasinya Pascasarjana Universitas Ahmad Dahlan
- Suliyannah. 2004. Rekonstruksi Perangkat Praktikum Fisika Dasar II untuk Menunjang Perkuliahan Fisika Dasar II di FMIPA UNESA. Yogyakarta : Prosiding Seminar Nasional Penelitian, Pendidikan dan Penerapan MIPA FMIPA Universitas Negeri Yogyakarta
- Supriono, E. 2009. Pengembangan Peralatan dan Alat Evaluasi Praktikum pada Matakuliah Elektronika Dasar. Yogyakarta: Prosiding Seminar Nasional Penelitian, Pendidikan dan Penerapan MIPA FMIPA Universitas Negeri Yogyakarta
- Swandi, A., Haris, A., Subaer. 2015. Development of Virtual Laboratory Hypermedia Based on Atomic Physics at SMAN 1 Pinrang. Yogyakarta : Proceeding of The 2<sup>nd</sup> International Conference on Research, Implementation and Education of Mathematics and Science Yogyakarta State University
- Wahyudi, H. 2009. Memanfaatkan Limbah Lampu Listrik untuk Media Pembelajaran Paikem mata pelajaran Fisika SMA. Yogyakarta: Prosiding Seminar Nasional Penelitian, Pendidikan dan Penerapan MIPA FMIPA Universitas Negeri Yogyakarta
- Widiatmono, R., Partini, J. 2009. Pemanfaatan Peralatan Praktikum Fisika Dasar untuk Demonstrasi Kelas pada Makul Mekanika guna Meningkatkan Motivasi dan Daya Serap Mahasiswa. Yogyakarta: Prosiding Seminar Nasional Penelitian, Pendidikan dan Penerapan MIPA FMIPA Universitas Negeri Yogyakarta