

**LAPORAN
PENELITIAN DASAR**



**PEMETAAN DAN EVALUASI LABORATORIUM FISIKA SMA DI
JAWA TIMUR DALAM UPAYA PENCAPAIAN KOMPETENSI DASAR
(KD) KETERAMPILAN KURIKULUM 2013 MELALUI “PHOTOVOICE”**

OLEH:

**Nadi Suprpto, S.Pd., M.Pd., Ph.D.
Dr. Titin Sunarti, M.Si.
Dra. Suliyannah, M.Si.**

**NIDN. 0012068102
NIDN. 0027116303
NIDN. 0006126108**

**KEMENTERIAN RISET, TEKNOLOGI, DAN PENDIDIKAN TINGGI
LEMBAGA PENELITIAN DAN PENGABDIAN KEPADA MASYARAKAT
UNIVERSITAS NEGERI SURABAYA
TAHUN 2019**

HALAMAN PENGESAHAN

Judul : Pemetaan dan Evaluasi Laboratorium Fisika SMA di Jawa Timur dalam Upaya Pencapaian Kompetensi Dasar (KD) Keterampilan Kurikulum 2013 Melalui "Photovoice"

Peneliti/Pelaksana

Nama Lengkap : Nadi Suprpto, M.Pd., Ph.D.
Perguruan Tinggi : Universitas Negeri Surabaya
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Perguruan Tinggi : Universitas Negeri Surabaya

Anggota (2)

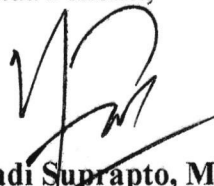
Nama Lengkap : Dr. Titin Sunarti, M.Si.
NIDN : 0027116303
Perguruan Tinggi : Universitas Negeri Surabaya

Institusi Mitra (Jika Ada)

Nama Institusi Mitra : -
Alamat : -
Penanggung Jawab : -
Tahun Pelaksanaan : Tahun ke 1 Dari rencana 2 tahun
Biaya Tahun Berjalan : Rp. 312.490.000,-
Biaya Keseluruhan : Rp. 742.045.000,-

Surabaya, 17 Desember 2019

Ketua Peneliti,



(Nadi Suprpto, M.Pd., Ph.D.)
NIDN 0012068102



PROTEKSI ISI LAPORAN KEMAJUAN PENELITIAN

Dilarang menyalin, menyimpan, memperbanyak sebagian atau seluruh isi laporan ini dalam bentuk apapun kecuali oleh peneliti dan pengelola administrasi penelitian

LAPORAN AKHIR PENELITIAN MULTI TAHUN

ID Proposal: 97c70454-f199-4322-8b14-f7f807ef5b49
Laporan Kemajuan Penelitian: tahun ke-1 dari 2 tahun

1. IDENTITAS PENELITIAN

A. JUDUL PENELITIAN

Pemetaan dan Evaluasi Laboratorium Fisika SMA di Jawa Timur dalam upaya Pencapaian Kompetensi Dasar (KD) Keterampilan Kurikulum 2013 melalui "Photovoice"

B. BIDANG, TEMA, TOPIK, DAN RUMPUN BIDANG ILMU

Bidang Fokus RIRN / Bidang Unggulan Perguruan Tinggi	Tema	Topik (jika ada)	Rumpun Bidang Ilmu
Sosial Humaniora, Seni Budaya, Pendidikan Penelitian Lapangan Dalam Negeri (Menengah)	Pendidikan	Sumber daya pendidikan (tenaga pendidik dan kependidikan)	Pendidikan Fisika

C. KATEGORI, SKEMA, SBK, TARGET TKT DAN LAMA PENELITIAN

Kategori (Kompetitif Nasional/ Desentralisasi/ Penugasan)	Skema Penelitian	Strata (Dasar/ Terapan/ Pengembangan)	SBK (Dasar, Terapan, Pengembangan)	Target Akhir TKT	Lama Penelitian (Tahun)
Penelitian Kompetitif Nasional	Penelitian Dasar	SBK Riset Dasar	SBK Riset Dasar	3	2

2. IDENTITAS PENGUSUL

Nama, Peran	Perguruan Tinggi/ Institusi	Program Studi/ Bagian	Bidang Tugas	ID Sinta	H-Index
NADI SUPRAPTO Ketua Pengusul	Universitas Negeri Surabaya	Pendidikan Fisika		74344	6
Dr. Dra TITIN SUNARTI M.Si Anggota Pengusul 2	Universitas Negeri Surabaya	Pendidikan Fisika		6010331	1
Dra SULIYANAH M.Si Anggota Pengusul 3	Universitas Negeri Surabaya	Pendidikan Fisika		6010381	3

3. MITRA KERJASAMA PENELITIAN (JIKA ADA)

Pelaksanaan penelitian dapat melibatkan mitra kerjasama, yaitu mitra kerjasama dalam melaksanakan penelitian, mitra sebagai calon pengguna hasil penelitian, atau mitra investor

Mitra	Nama Mitra
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4. LUARAN DAN TARGET CAPAIAN

Luaran Wajib

Tahun Luaran	Jenis Luaran	Status target capaian (<i>accepted, published, terdaftar atau granted, atau status lainnya</i>)	Keterangan (<i>url dan nama jurnal, penerbit, url paten, keterangan sejenis lainnya</i>)
1	Publikasi Ilmiah Jurnal Internasional	accepted/published	International Journal of Instruction (Q3)

Luaran Tambahan

Tahun Luaran	Jenis Luaran	Status target capaian (<i>accepted, published, terdaftar atau granted, atau status lainnya</i>)	Keterangan (<i>url dan nama jurnal, penerbit, url paten, keterangan sejenis lainnya</i>)
1	Publikasi Ilmiah Jurnal Nasional Terakreditasi	submitted	JPFA

5. ANGGARAN

Rencana anggaran biaya penelitian mengacu pada PMK yang berlaku dengan besaran minimum dan maksimum sebagaimana diatur pada buku Panduan Penelitian dan Pengabdian kepada Masyarakat Edisi 12.

Total RAB 2 Tahun Rp. 742,045,000

Tahun 1 Total Rp. 312,490,000

Jenis Pembelanjaan	Item	Satuan	Vol.	Biaya Satuan	Total
Analisis Data	HR Sekretariat/Administrasi Peneliti	OB	3	300,000	900,000
Analisis Data	Honorarium narasumber	OJ	6	900,000	5,400,000
Analisis Data	HR Pengolah Data	P (penelitian)	10	900,000	9,000,000
Analisis Data	Uang Harian	OH	24	150,000	3,600,000
Analisis Data	Transport Lokal	OK (kali)	24	150,000	3,600,000
Analisis Data	Biaya konsumsi rapat	OH	24	90,000	2,160,000
Bahan	Bahan Penelitian (Habis Pakai)	Unit	1	27,448,000	27,448,000
Bahan	Barang Persediaan	Unit	1	6,500,000	6,500,000
Bahan	ATK	Paket	100	85,500	8,550,000
Pelaporan, Luaran Wajib, dan Luaran Tambahan	Biaya Publikasi artikel di Jurnal Nasional	Paket	1	1,500,000	1,500,000
Pelaporan, Luaran Wajib, dan Luaran Tambahan	Publikasi artikel di Jurnal Internasional	Paket	1	15,000,000	15,000,000
Pelaporan, Luaran Wajib, dan Luaran	Luaran KI (paten, hak cipta dll)	Paket	1	2,500,000	2,500,000

Jenis Pembelanjaan	Item	Satuan	Vol.	Biaya Satuan	Total
Tambahan					
Pelaporan, Luaran Wajib, dan Luaran Tambahan	Biaya Luaran Iptek lainnya (purwa rupa, TTG dll)	Paket	1	5,000,000	5,000,000
Pelaporan, Luaran Wajib, dan Luaran Tambahan	Biaya seminar nasional	Paket	2	5,776,000	11,552,000
Pelaporan, Luaran Wajib, dan Luaran Tambahan	Biaya seminar internasional	Paket	2	17,000,000	34,000,000
Pelaporan, Luaran Wajib, dan Luaran Tambahan	HR Sekretariat/Administrasi Peneliti	OB	3	300,000	900,000
Pelaporan, Luaran Wajib, dan Luaran Tambahan	Uang harian rapat di dalam kantor	OH	30	150,000	4,500,000
Pelaporan, Luaran Wajib, dan Luaran Tambahan	Uang harian rapat di luar kantor	OH	30	300,000	9,000,000
Pelaporan, Luaran Wajib, dan Luaran Tambahan	Biaya konsumsi rapat	OH	30	90,000	2,700,000
Pelaporan, Luaran Wajib, dan Luaran Tambahan	Biaya penyusunan buku termasuk book chapter	Paket	50	250,000	12,500,000
Pengumpulan Data	FGD persiapan penelitian	Paket	1	22,020,000	22,020,000
Pengumpulan Data	HR Pembantu Peneliti	OJ	2	80,000	160,000
Pengumpulan Data	HR Sekretariat/Administrasi Peneliti	OB	2	300,000	600,000
Pengumpulan Data	HR Pembantu Lapangan	OH	5	80,000	400,000
Pengumpulan Data	Transport	OK (kali)	100	75,000	7,500,000
Pengumpulan Data	Tiket	OK (kali)	100	200,000	20,000,000
Pengumpulan Data	Uang Harian	OH	100	100,000	10,000,000
Pengumpulan Data	Penginapan	OH	100	250,000	25,000,000
Pengumpulan Data	Uang harian rapat di dalam kantor	OH	100	75,000	7,500,000
Pengumpulan Data	Uang harian rapat di luar kantor	OH	100	100,000	10,000,000
Pengumpulan Data	Biaya konsumsi	OH	100	60,000	6,000,000
Pengumpulan Data	HR Petugas Survei	OH/OR	1500	8,000	12,000,000
Sewa Peralatan	Obyek penelitian	Unit	50	250,000	12,500,000
Sewa Peralatan	Ruang penunjang penelitian	Unit	50	250,000	12,500,000

Tahun 2 Total Rp. 429,555,000

Jenis Pembelanjaan	Item	Satuan	Vol.	Biaya Satuan	Total
Analisis Data	HR Sekretariat/Administrasi Peneliti	OB	3	300,000	900,000
Analisis Data	HR Pengolah Data	P (penelitian)	10	900,000	9,000,000
Analisis Data	Honorarium narasumber	OJ	10	900,000	9,000,000
Analisis Data	Uang Harian	OH	24	150,000	3,600,000
Analisis Data	Transport Lokal	OK (kali)	24	150,000	3,600,000
Analisis Data	Biaya konsumsi rapat	OH	24	90,000	2,160,000
Bahan	Bahan Penelitian (Habis Pakai)	Unit	1	30,392,400	30,392,400
Bahan	Barang Persediaan	Unit	1	31,994,600	31,994,600
Bahan	ATK	Paket	120	127,500	15,300,000
Pelaporan, Luaran Wajib, dan Luaran Tambahan	Biaya seminar nasional	Paket	1	16,828,000	16,828,000
Pelaporan, Luaran Wajib, dan Luaran Tambahan	Biaya seminar internasional	Paket	1	47,000,000	47,000,000
Pelaporan, Luaran Wajib, dan Luaran Tambahan	Biaya Publikasi artikel di Jurnal Nasional	Paket	1	1,500,000	1,500,000
Pelaporan, Luaran Wajib, dan Luaran Tambahan	Luaran KI (paten, hak cipta dll)	Paket	1	5,000,000	5,000,000
Pelaporan, Luaran Wajib, dan Luaran Tambahan	Biaya Luaran Iptek lainnya (purwa rupa, TTG dll)	Paket	1	10,000,000	10,000,000
Pelaporan, Luaran Wajib, dan Luaran Tambahan	Publikasi artikel di Jurnal Internasional	Paket	2	15,000,000	30,000,000
Pelaporan, Luaran Wajib, dan Luaran Tambahan	HR Sekretariat/Administrasi Peneliti	OB	3	300,000	900,000
Pelaporan, Luaran Wajib, dan Luaran Tambahan	Uang harian rapat di dalam kantor	OH	30	150,000	4,500,000
Pelaporan, Luaran Wajib, dan Luaran Tambahan	Uang harian rapat di luar kantor	OH	30	300,000	9,000,000
Pelaporan, Luaran Wajib, dan Luaran Tambahan	Biaya konsumsi rapat	OH	30	90,000	2,700,000
Pelaporan, Luaran Wajib, dan Luaran Tambahan	Biaya penyusunan buku termasuk book chapter	Paket	100	250,000	25,000,000
Pengumpulan Data	FGD persiapan penelitian	Paket	1	23,220,000	23,220,000

Jenis Pembelanjaan	Item	Satuan	Vol.	Biaya Satuan	Total
Pengumpulan Data	HR Pembantu Peneliti	OJ	2	80,000	160,000
Pengumpulan Data	HR Sekretariat/Administrasi Peneliti	OB	2	300,000	600,000
Pengumpulan Data	HR Pembantu Lapangan	OH	5	100,000	500,000
Pengumpulan Data	Transport	OK (kali)	120	75,000	9,000,000
Pengumpulan Data	Tiket	OK (kali)	120	200,000	24,000,000
Pengumpulan Data	Uang Harian	OH	120	100,000	12,000,000
Pengumpulan Data	Penginapan	OH	120	250,000	30,000,000
Pengumpulan Data	Uang harian rapat di dalam kantor	OH	120	75,000	9,000,000
Pengumpulan Data	Uang harian rapat di luar kantor	OH	120	100,000	12,000,000
Pengumpulan Data	Biaya konsumsi	OH	120	60,000	7,200,000
Pengumpulan Data	HR Petugas Survei	OH/OR	1500	8,000	12,000,000
Sewa Peralatan	Obyek penelitian	Unit	60	250,000	15,000,000
Sewa Peralatan	Ruang penunjang penelitian	Unit	60	275,000	16,500,000

6. KEMAJUAN PENELITIAN

A. RINGKASAN: Tuliskan secara ringkas latar belakang penelitian, tujuan dan tahapan metode penelitian, luaran yang ditargetkan, serta uraian TKT penelitian.

Kurikulum 2013 (K13) dalam Kompetensi Dasarnya menuntut keseimbangan antara Kompetensi Dasar (KD) pengetahuan (KD3) dan keterampilan (KD4). Namun kenyataan di lapangan menunjukkan ranah pengetahuan lebih diperhatikan dari pada ranah keterampilan. Sehingga tidak mengherankan jika dalam proses pembelajaran dan asesmennya kurang optimal. Guru hanya fokus mengajar dan mengases kompetensi pengetahuan dan sering mengabaikan kompetensi keterampilan peserta didik. Di sisi lain, laboratorium fisika SMA seharusnya tersedia untuk menjembatani pencapaian KD4 tersebut. Oleh karena itu, tim peneliti yang sekaligus pembimbing calon guru fisika di Jawa Timur merasa bertanggung jawab terhadap situasi yang terjadi, khususnya dalam mengukur efektifitas kurikulum 2013. Berbekal rasional tersebut maka rumusan masalah (RM) tahun pertama (1-2) dan tahun kedua (3-4) dalam penelitian ini adalah sebagai berikut.

1) Seberapa jauh kesiapan laboratorium fisika SMA di Jawa Timur dalam upaya pencapaian Kompetensi Dasar (KD) Keterampilan? 2) Faktor-faktor apa sajakah yang mempengaruhi kesiapan laboratorium fisika SMA di Jawa Timur dalam upaya pencapaian KD Keterampilan? 3) Adakah hubungan antara kesiapan laboratorium fisika SMA dengan pencapaian KD Keterampilan peserta didik? 4) Bagaimanakah model peta kesiapan laboratorium fisika SMA dengan pencapaian KD Keterampilan peserta didik?

Metode penelitian yang digunakan adalah mixed method dengan teknik exploratory research design. Sasaran penelitian adalah SMA Negeri dan Swasta di Jawa Timur yang menjadi mitra dalam pelaksanaan Program Praktik Lapangan (PPL). Strategi "Participatory Action Research" digunakan dengan melibatkan mahasiswa Pendidikan Fisika Universitas Negeri Surabaya sebanyak 3 kelas. Secara garis besar, penelitian diawali dengan pengumpulan data secara kualitatif melalui teknik "photovoice" dan Focus Group Discussion (FGD) serta dilanjutkan dengan pengumpulan data secara kuantitatif melalui pemberian

questionnaire terkait persepsi guru, peserta didik, dan kepala sekolah terhadap laboratorium fisika SMA dan tes keterampilan.

Analisis data yang digunakan adalah analisis foto (photo analysis) dilanjutkan dengan teknik koding untuk menjawab RM 1. Sementara untuk mengeksplorasi faktor-faktor apa sajakah yang mempengaruhi kesiapan laboratorium fisika SMA di Jawa Timur (RM2), data kuisioner dianalisis dengan Exploratory Factor Analysis (EFA) dan Confirmatory Factor Analysis (EFA). Tes korelasi dan regresi digunakan untuk menjawab RM 3, setelah sebelumnya tes keterampilan dianalisis dengan statistik deskriptif (mean, standar deviasi) dan N-gain ternormalisasi. Data-data kualitatif dan kuantitatif selanjutnya dilakukan reduksi dan triangulasi data untuk membangun kesimpulan yang komprehensif untuk menjawab RM4.

Urgensi penelitian ini bisa dilihat dari beberapa implikasinya. Bagi pemerintah, hasil pemetaan laboratorium fisika akan membantu dalam meninjau kembali efektifitas pelaksanaan K13 khususnya ranah keterampilan. Bagi sekolah bisa dijadikan bahan evaluasi, apakah saat ini standar sarana prasarana dalam hal ini laboratorium fisika sudah menunjang standar isi kurikulum. Adapun bagi LPTK, sebagai pedoman dalam penyusunan kurikulum yang sesuai dengan kebutuhan stakeholder khususnya terkait pencapaian kompetensi keterampilan fisika.

Luaran yang dijanjikan dalam penelitian ini adalah masing-masing satu artikel di jurnal internasional bereputasi dan prosiding terindeks pada database bereputasi di setiap tahunnya, serta satu buku hasil penelitian ber-ISBN dan hak cipta di akhir tahun kedua. Adapun kesiapterapan teknologi (TKT) yang ditargetkan pada tahun pertama yaitu prinsip dasar riset yang telah diobservasi dan dilaporkan serta dihasilkannya dukungan data awal, hipotesis, desain dan prosedur penelitian. Selanjutnya, rancangan dan metodologi penelitian yang baku menjadi target di tahun kedua.

B. KATA KUNCI: Tuliskan maksimal 5 kata kunci.

pemetaan; laboratorium fisika; SMA; Jawa Timur; photovoice

Pengisian poin C sampai dengan poin H mengikuti template berikut dan tidak dibatasi jumlah kata atau halaman namun disarankan ringkas mungkin. Dilarang menghapus/modifikasi template ataupun menghapus penjelasan di setiap poin.

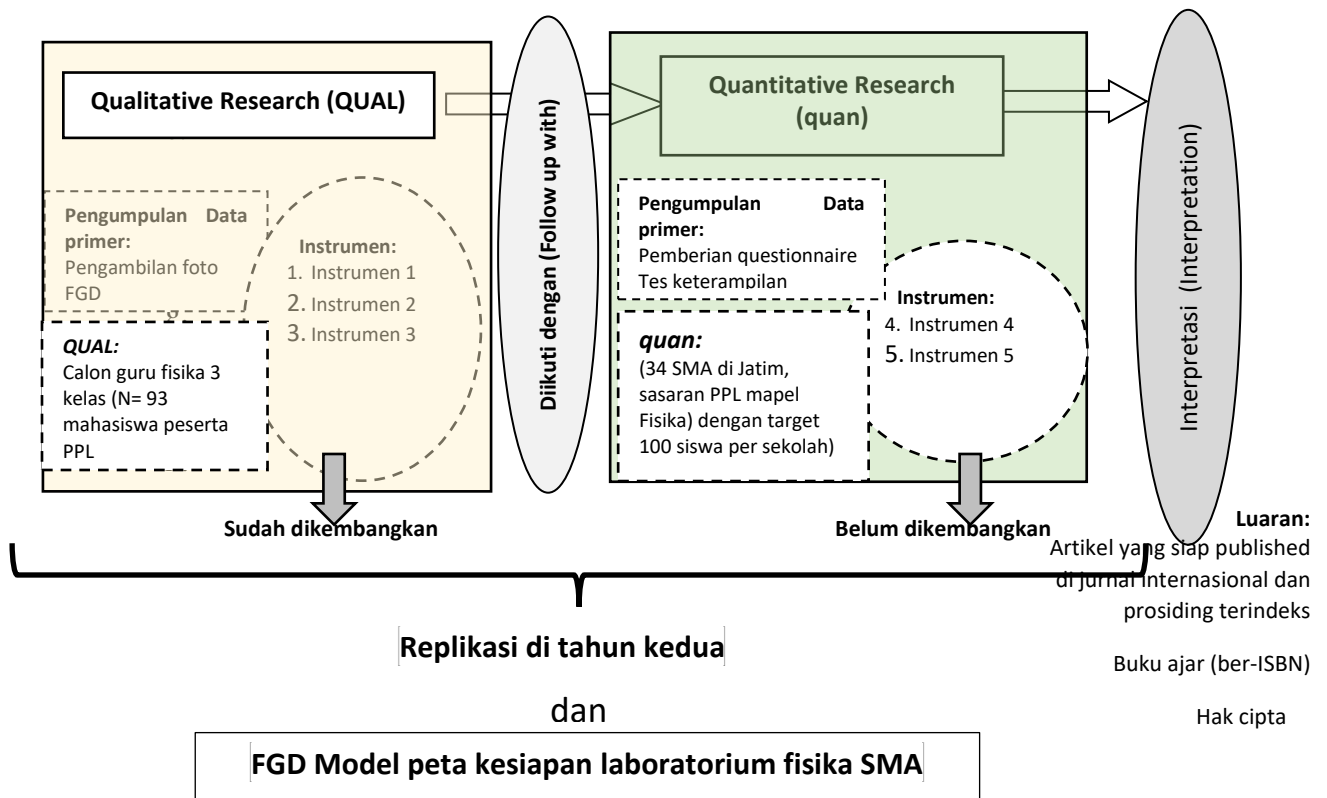
C. HASIL PELAKSANAAN PENELITIAN: Tuliskan secara ringkas hasil pelaksanaan penelitian yang telah dicapai sesuai tahun pelaksanaan penelitian. Penyajian dapat berupa data, hasil analisis, dan capaian luaran (wajib dan atau tambahan). Seluruh hasil atau capaian yang dilaporkan harus berkaitan dengan tahapan pelaksanaan penelitian sebagaimana direncanakan pada proposal. Penyajian data dapat berupa gambar, tabel, grafik, dan sejenisnya, serta analisis didukung dengan sumber pustaka primer yang relevan dan terkini.

Pengisian poin C sampai dengan poin H mengikuti template berikut dan tidak dibatasi jumlah kata atau halaman namun disarankan ringkas mungkin. Dilarang menghapus/memodifikasi template ataupun menghapus penjelasan di setiap poin.

C. HASIL PELAKSANAAN PENELITIAN: Tuliskan secara ringkas hasil pelaksanaan penelitian yang telah dicapai sesuai tahun pelaksanaan penelitian. Penyajian meliputi data, hasil analisis, dan capaian luaran (wajib dan atau tambahan). Seluruh hasil atau capaian yang dilaporkan harus berkaitan dengan tahapan pelaksanaan penelitian sebagaimana direncanakan pada proposal. Penyajian data dapat berupa gambar, tabel, grafik, dan sejenisnya, serta analisis didukung dengan sumber pustaka primer yang relevan dan terkini.

Hasil-hasil penelitian yang diperoleh saat ini meliputi beberapa hal yang dideskripsikan berikut ini [1-6]:

1. Instrumen penelitian telah dikembangkan dan telah diuji validasi dan reliabilitasnya. Instrumen pernah diujicobakan saat ketua peneliti melakukan studi doktoral di NDHU Taiwan dan telah dinyatakan valid dan siap digunakan.
2. Berdasarkan instrumen tersebut, telah diperoleh data-data penelitian sesuai dengan perencanaan di proposal yang meliputi:
 - a. Panduan *photovoice* dan Pedoman koding foto (instrumen 1 dan 2)
 - b. Hasil *Focus Group Discussion* antara peneliti, mahasiswa sebagai *co-researcher (Participatory Action Research)* (instrumen 3).
 - c. Hasil isian angket (questionnaire) terkait persepsi guru, peserta didik, dan kepala sekolah terhadap laboratorium fisika SMA (instrumen 4)
 - d. Hasil tes keterampilan fisika SMA (instrumen 5)
3. Dihasilkan diagram alir penelitian yang baku untuk jenis penelitian *mixed-method*.



Gambar 1. Diagram alir penelitian [7]

4. Telah dilakukan pengkodean atau *coding* terhadap semua data kualitatif, meliputi: data hasil studi dokumentasi melalui *photo voice*, dan menjadi dasar dalam penulisan buku “Profil Laboratorium Fisika SMA di Jawa Timur melalui Photovoice” dan ISBNnya sudah rilis (ISBN No. **978-602-5847-29-5**).

ISBN					
		username	password	Log in	Daftar Online
<p>Hasil pencarian 'Nadi Suprpto' berdasarkan kategori 'Pengarang'</p>					
<input type="text" value="Search"/>					
Judul	Seri	Pengarang	Penerbit	ISBN	
- Profil laboratorium fisika SMA di Jawa Timur melalui Photovoice		penulis, Nadi Suprpto...[et al.]	Pondok Pesantren (Ponpes) Jagad 'Alimussirry	978-602-5847-29-5	
<p>Judul: Profil laboratorium fisika SMA di Jawa Timur melalui Photovoice Penerbit: Pondok Pesantren (Ponpes) Jagad 'Alimussirry Pengarang: penulis, Nadi Suprpto...[et al.] Tahun: 2019 Received: - Seri: - ISBN: 978-602-5847-29-5 Website: penerbitjagadalimussirry.com Email: penerbitjagadalimussirry@gmail.com</p>					

Gambar 2. Luaran berupa buku yang sudah ber-ISBN

5. Melalui kegiatan FGD tentang teknik fotografi telah direkomendasikan usulan mata kuliah baru di prodi pendidikan fisika Unesa, yaitu Fisika Fotografi dan akan diberlakukan mulai angkatan 2019 sebagai mata kuliah pilihan.



Gambar 3. Pelaksanaan FGD dan workshop fotografi awal direkomendasikan mata kuliah baru: fisika fotografi

6. Telah dilakukan entri data kuantitatif khususnya data hasil angket terkait persepsi guru, peserta didik, dan kepala sekolah terhadap laboratorium fisika SMA pada program SPSS dan AMOS, untuk selanjutnya dilakukan analisis data dengan EFA, CFA, dan SEM dan akan ditulis menjadi satu judul artikel untuk siap dipublikasikan [10].
7. Data-data kualitatif dan kuantitatif selanjutnya dilakukan reduksi dan triangulasi data untuk membangun kesimpulan yang komprehensif dengan mengacu pada referensi [8-9].

8. Berdasarkan data tersebut, sebagian telah diolah dan ditulis dalam artikel baik dalam jurnal maupun prosiding terindeks Scopus. Melalui penelitian ini telah ditulis untuk dipublikasikan dalam bentuk artikel baik diseminarkan dan masuk *conference proceeding* terindeks Scopus maupun jurnal internasional, disampaikan dalam kuliah tamu, dan *keynote speakers*. Secara substansi diuraikan sebagai berikut:

- a. *Indonesian Physics Laboratory: Learning Physics Concept through Photovoice*, sedang under review di Journal of Science Education (scopus Q4: SJR=0,12) yang berisi hasil eksplorasi keadaan laboratorium fisika SMA di Jawa Timur dalam rangka mendukung kompetensi dasar (KD) keterampilan K13. Artikel ini juga telah dipresentasikan dalam ICRCOS, LPPM Universitas Negeri Surabaya, Hotel Golden Tulip Legacy, 7 September 2019.
<http://icracos.lppm.unesa.ac.id/>
- b. *“Let me show”*: *Pre-service teachers voice of physics laboratory through photo elicitation*, sedang persiapan di Learning, Media & Technology (Scopus Q2).
- c. *Pre-service physics teachers experiences of being member of photo voice project*, telah diseminarkan di URICSE Univ Riau pada tanggal 6 September 2019, dan akan dimuat di Journal of Physics Conference Series Vol 1351 tahun 2019.
- d. *Essential factors influencing preparation of physics laboratory in new curriculum: Photo voice study*, telah diseminarkan di URICSE Univ Riau pada tanggal 6 September 2019, dan akan dimuat di Journal of Physics Conference Series Vol 1351 tahun 2019.
- e. Pembicara dalam kuliah Tamu (*Guest Lecture*) di Universitas Islam Madura, dengan judul *Participatory Action Research (PAR)* bagi calon guru fisika melalui *photovoice* untuk melatih *higher order thinking skills (HOTS)*.



Gambar 4. Ketua peneliti menjadi pembicara tamu di Universitas Islam Madura, Pamekasan

- f. Buku dengan judul Profil Laboratorium Fisika SMA di Jawa Timur melalui *Photovoice* yang telah ber-ISBN dan akan diusulkan hak ciptanya.

D. STATUS LUARAN: Tuliskan jenis, identitas dan status ketercapaian setiap luaran wajib dan luaran tambahan (jika ada) yang dijanjikan. Jenis luaran dapat berupa publikasi, perolehan kekayaan intelektual, hasil pengujian atau luaran lainnya yang telah dijanjikan pada proposal. Uraian status luaran harus didukung dengan bukti kemajuan ketercapaian luaran sesuai dengan luaran yang dijanjikan. Lengkapi isian jenis luaran yang dijanjikan serta mengunggah bukti dokumen ketercapaian luaran wajib dan luaran tambahan melalui Simlitabmas.

Luaran yang direncanakan

Luaran Wajib

Tahun Luaran	Jenis Luaran	Status target capaian (accepted, published, terdaftar atau granted, atau status lainnya)	Keterangan (url dan nama jurnal, penerbit, url paten, keterangan sejenis lainnya)
(1) 2019	Publikasi Ilmiah Jurnal Internasional	accepted/published	International Journal of Instruction (Q3)

Luaran Tambahan

Tahun Luaran	Jenis Luaran	Status target capaian (accepted, published, terdaftar atau granted, atau status lainnya)	Keterangan (url dan nama jurnal, penerbit, url paten, keterangan sejenis lainnya)
(1) 2019	Publikasi Ilmiah Jurnal Nasional Terakreditasi	submitted	JPFA
(1) 2019	Prosiding dalam pertemuan ilmiah Internasional	draft	JPCS IOP (Q3)

Luaran wajib yang dijanjikan di tahun pertama adalah publikasi artikel di jurnal internasional. Sementara luaran tambahan yang dijanjikan adalah publikasi ilmiah di jurnal nasional terakreditasi dan Prosiding dalam pertemuan ilmiah Internasional. Luaran yang telah diperoleh sampai saat ini adalah sebagai berikut:

Realisasi Luaran:

1. Artikel Jurnal

No	Judul Artikel	Nama Jurnal	Status Kemajuan*)
1	Indonesian Physics Laboratory: Learning Physics Concept through Photovoice	Journal of Science Education	Under review
2.	“Let me show”: Pre-service teachers voice of physics laboratory through photo elicitation	Learning, Media & Technology	Persiapan (final editing)

*) Status kemajuan: Persiapan, submitted, under review, accepted, published

2. Artikel Konferensi

No	Judul Artikel	Detil Konferensi (Nama, penyelenggara, tempat, tanggal)	Status Kemajuan*)
1.	Indonesian Physics Laboratory: Learning Physics Concept through Photovoice	ICRACOS, LPPM Universitas Negeri Surabaya, Hotel Golden Tulip Legacy, 7 September 2019. http://icracos.lppm.unesa.ac.id/	Accepted (sudah ada LoA)
2.	Pre-service physics teachers experiences of being member of photo voice project	URICSE, Universitas Riau, Grand Suka Hotel Pekanbaru, 10 September 2019	Accepted (sudah ada LoA), JPCS Vol 1351 terindeks Scopus
3.	Essential factors influencing preparation of physics laboratory in new curriculum: Photo voice study	URICSE, Universitas Riau, Grand Suka Hotel Pekanbaru, 10 September 2019	Accepted (sudah ada LoA), JPCS Vol 1351 terindeks Scopus

*) Status kemajuan: Persiapan, submitted, under review, accepted, presented

3. Pembicara dalam Kuliah Tamu (Guest Lecture)

No	Judul Presentasi	Detil Penyelenggara (Nama, penyelenggara, tempat, tanggal)	Status Kemajuan*)
1.	Participatory Action Research (PAR) bagi calon guru fisika melalui photovoice untuk melatih higher order thinking skills (HOTS)	Universitas Islam Madura	presented

*) Status kemajuan: Persiapan, submitted, under review, accepted, presented

4. Hak Cipta

No	Judul Usulan Hak Cipta	Status Kemajuan*)
1.	Judul: Profil laboratorium fisika SMA di Jawa Timur melalui Photovoice ISBN No. 978-602-5847-29-5 Penerbit: Pondok Pesantren (Ponpes) Jagad 'Alimussirry Pengarang: penulis, Nadi Suprpto...[et al.] Tahun: 2019	Persiapan (draft)

*) Status kemajuan: Persiapan, submitted, under review

E. PERAN MITRA: Tuliskan realisasi kerjasama dan kontribusi Mitra baik *in-kind* maupun *in-cash* (untuk Penelitian Terapan, Penelitian Pengembangan, PTUPT, PPUPT serta KRUPPT). Bukti pendukung realisasi kerjasama dan realisasi kontribusi mitra dilaporkan sesuai dengan kondisi yang sebenarnya. Bukti dokumen realisasi kerjasama dengan Mitra diunggah melalui Simlitabmas.

Tidak ada mitra penelitian untuk tahun pertama

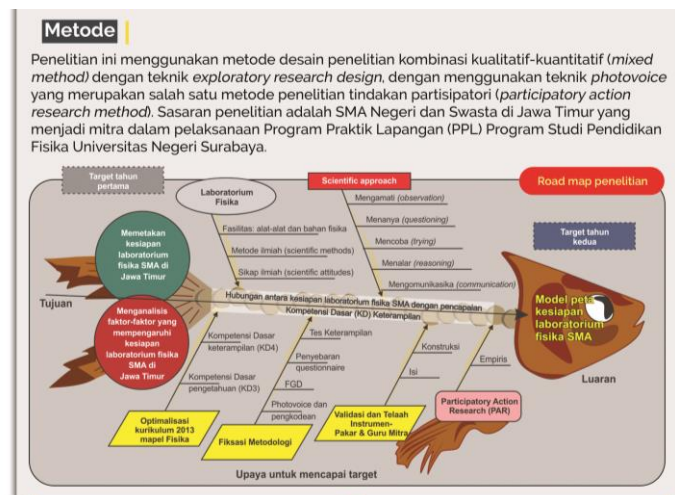
F. KENDALA PELAKSANAAN PENELITIAN: Tuliskan kesulitan atau hambatan yang dihadapi selama melakukan penelitian dan mencapai luaran yang dijanjikan, termasuk penjelasan jika pelaksanaan penelitian dan luaran penelitian tidak sesuai dengan yang direncanakan atau dijanjikan.

- Berdasarkan luaran yang dijanjikan oleh peneliti di tahun pertama, ada beberapa pergeseran dalam hal luaran, misalnya peneliti menjanjikan luaran wajib 1 artikel di jurnal internasional dan luaran tambahan berupa 1 artikel submitted di jurnal nasional terakreditasi dan 1 artikel prosiding dalam pertemuan ilmiah internasional. Saat ini ada dua artikel untuk jurnal internasional, dengan status yang pertama *under review* dan yang kedua persiapan. Namun peneliti telah menghasilkan 2 artikel di Journal physics conference series Scopus Q3 sebagai hasil dari international conference di Universitas Riau melalui URICSE (Universitas Riau International Conference of Science and Environment).
- Luaran yang dijanjikan terkait jurnal nasional terakreditasi tetap akan dipenuhi dan bila tidak memungkinkan akan diganti oleh peneliti di jurnal internasional dengan melihat rasionalnya Hal ini dikarenakan tidak banyak jurnal terakreditasi nasional yang sesuai dengan kajian penelitian ini. Meskipun demikian tim peneliti tetap berupaya untuk memenuhi tagihan ini.

G. RENCANA TAHAPAN SELANJUTNYA: Tuliskan dan uraikan rencana penelitian di tahun berikutnya berdasarkan indikator luaran yang telah dicapai, rencana realisasi luaran wajib yang dijanjikan dan tambahan (jika ada) di tahun berikutnya serta *roadmap* penelitian keseluruhan. Pada bagian ini diperbolehkan untuk melengkapi penjelasan dari setiap tahapan dalam metoda yang akan direncanakan termasuk jadwal berkaitan dengan strategi untuk mencapai luaran seperti yang telah dijanjikan dalam proposal. Jika diperlukan, penjelasan dapat juga dilengkapi dengan gambar, tabel, diagram, serta pustaka

yang relevan. Jika laporan kemajuan merupakan laporan pelaksanaan tahun terakhir, pada bagian ini dapat dituliskan rencana penyelesaian target yang belum tercapai.

1. Finalisasi proses pengkodean atau *coding* terhadap semua data kualitatif, meliputi: data hasil FGD, hasil *photo capture*, dan hasil persepsi laboratorium fisika dengan *photovoice*, untuk selanjutnya dilakukan *Photo analysis*.
2. Finalisasi data kuantitatif khususnya data hasil angket terkait persepsi laboratorium fisika pada program SPSS dan AMOS, untuk selanjutnya dilakukan analisis data dengan EFA, CFA, dan SEM dan ditulis sebuah artikel terkait persepsi pengguna laboratorium fisika di Jawa Timur dalam kaitannya dengan pelaksanaan kurikulum 2013 ditinjau dari kompetensi dasar (KD) keterampilan.
3. Melakukan entri data kuantitatif hasil tes keterampilan ke program Excel untuk selanjutnya dilakukan analisis kuantitatif. Tes keterampilan dianalisis dengan statistik deskriptif (mean, standar deviasi) dan N-gain ternormalisasi dan selanjutnya dilakukan uji korelasi dan regresi.
4. Pemetaan sebaran SMA yang akan dieksplorasi kondisi laboratorium fisiknya agar benar-benar merepresentasikan kondisi Jawa Timur untuk bahan refleksi pengambilan data di tahun kedua. Untuk tahun pertama baru dieksplorasi 34 sekolah. Untuk itu di tahun kedua akan diupayakan lebih banyak lagi.
5. Pendaftaran hak cipta untuk buku Profil laboratorium fisika SMA di Jawa Timur melalui Photovoice sebagai target luaran di tahun kedua.
6. Pendaftaran hak cipta untuk diagram model *fishbone* dalam penelitian ini, sebagaimana yang disarankan reviewer saat pelaksanaan monev internal.



Gambar 5. *Fishbone diagram*

H. DAFTAR PUSTAKA: Penyusunan Daftar Pustaka berdasarkan sistem nomor sesuai dengan urutan pengutipan. Hanya pustaka yang disitasi pada laporan kemajuan yang dicantumkan dalam Daftar Pustaka.

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Dokumen pendukung luaran Wajib #1

Luaran dijanjikan: Publikasi Ilmiah Jurnal Internasional

Target: accepted/published

Dicapai: Sedang direview

Dokumen wajib diunggah:

1. Bukti sedang direview
2. Naskah artikel

Dokumen sudah diunggah:

1. Naskah artikel
2. Bukti sedang direview

Dokumen belum diunggah:

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Indonesian Physics Laboratory: Learning Physics Concept through Photovoice

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Abstract

The laboratory is a centre and a place that is representing the characteristic of science as a process through laboratory activity. As a process, scientific approach can't be separated from laboratory activities. To understand the real laboratory, especially in a physics laboratory, we conducted laboratory activities by observing them through Participatory Action Research (PAR) as a research method. The role of PAR's member is a co-researcher and co-observer. Totally, 90 pre-service physics teachers from three classes in a public university in Surabaya, Indonesia contributed as PAR members. From these members of PAR, some data can be captured by using photovoice that it can be easier to describe the condition of the real physics laboratory. The results of the study illustrate three themes of imaging physics laboratory in Indonesia: (1) the condition of real physics laboratories in Indonesia, (2) the readiness of tools, materials, and procedural laboratory activities and (3) The comparison of the physics concepts among students through experimentation and theoretical ways.

Keywords: *Laboratory, physics, photovoice, participatory action research (PAR)*

Introduction

A half-century ago, scientists began to have a picture of the dividing walls of the work, now called laboratories (Latour, 1983). Natural laboratories are the real world of work, but some scientists are reluctant to go directly, besides being supported by special conditions of equipment that cannot be used outdoors.

In the development, laboratories are the centre and characteristic of science (Hofstein & Lunetta, 2003; Mubarak, Lutfiyah, Kholiq, Suprpto, & Putri, 2018; Wiratma, & Subagia, 2014). Changes in terms of space and tools used have begun to be noticed, other than that in the laboratory activities. Various versions have been introduced over the years, numerous investigators have reported on the validity to assess the physical activity in the laboratory and field settings (Kelly, McMillan, Anderson, Fippinger, Fillerup, & Rider, 2013).

The laboratory is the right mode for developing scientific work. Generally, the process (scientific work) conceded by researchers in carrying out scientific work includes the following steps: (1) observing existing phenomena (library exploration); (2) asking the question why the phenomena occur (formulating the problem); (3) make a hypothesis to answer the problem raised or explain the reason; (4) planning an experiment and conducting experiments to test the hypothesis; (5) draw conclusions whether the hypothesis is correct or not based on experiments conducted (Suparno, 2006). The laboratory becomes a learning experience so that researchers or students interact with laboratory equipment directly.

Various types of research stated that laboratories are very petrified in learning activities, especially in science lessons. In this case, it is more specific in the field of physics. Physics is a science that requires observation and measurement carried out through experiments. Observation of natural phenomena is done by observing and analyzing the causes and effects of factors that are interrelated and influenced (Sani, 2012). Limited experiments can be carried out in a laboratory with good management and control. Meanwhile, in Basori's research (Hayat & Yusuf, 2010) which is about laboratory activities based on problem solving can improve students' science process skills, also encourages the acquisition of practical abilities (Okebukola, & Ogunniyi, 1984; Rakhmawan, Setiabudi, & Mudzakir, 2015) and understanding concepts in science (physics) and its applications (Hofstein & Mamlok-Naaman, 2007).

Through laboratory activities, students can study the truth of concepts learned theoretically through critical analysis based on their intellectual abilities. The most prominent issue in learning in the laboratory is the quality management problem of the laboratory, which includes the process of procuring, using, maintaining tools, and materials (Wiratma & Subagia, 2014). In this case, especially in Indonesia, the question is how about the readiness and ability of teachers and laboratory assistants in preparing tools and materials for carrying out laboratory activities (Tobin, 1986).

To illustrate how the actual condition of the readiness and capability of a laboratory and its activities, photovoice is a proposed method. In practice, photovoice combines the results of photographs or documentation of individual and group actions through surveys, focus groups, nominal group processes, and other methods (Herbert, Baize-Ward, Sutton-Brown, 2014, & Latz, 2018; Wang, 1999).

In this study, through those methods, it is expected to find out (1) the condition of real physics laboratories in Indonesia, (2) the readiness of tools, materials and procedural

laboratory activities and (3) the comparison of the physics concepts among students through experimentation and theoretical ways.

Methodology

The research design used a descriptive qualitative with participatory action research (PAR) method. Additionally, we used a photo-elicitation method to get the data through documentation and voice of respondents. Participants of the study consisted of senior students as pre-service physics teachers (PSPTs) from the public university in Surabaya that follows the teaching practice program (PLP program) as “a community practice” (dos Santos & Arroio, 2016). There were 90 PSPTs joined to the study as PAR members. Starting from the focus group discussion (FGD), the PAR members have continued to PLP program and interacting with respondents. The respondents of this research are teachers and senior high school students in several areas of East Java, Indonesia. The research is concerned with tools and materials inside the laboratory, laboratory activity, the procedural to conducting an experiment and the topic of laboratory activity in physics subject. Figure 1 illustrates the process of data collection.

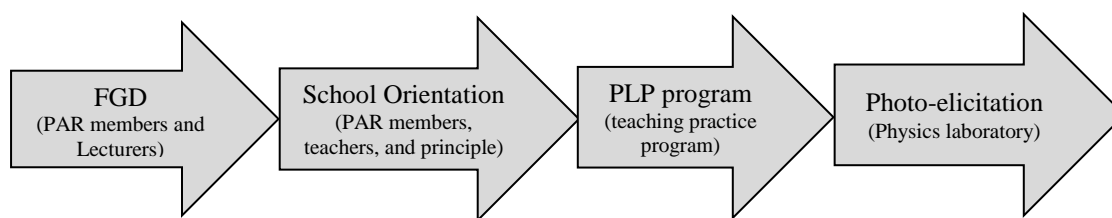


Figure 1. Data collection process

The photovoice method used in this study not only captures laboratory conditions and activities, but it also provides innovative and reflective methods to show these values to the community of academics about the laboratory. The research takes a unique and exciting method to “voice” the views of teachers and students in responding to laboratory conditions and classroom learning using digital technology (Baldwin & Chandler, 2010).

Result and Discussion

In this research, we divided three themes to describe physics laboratory based on the photo captured through photo elicitation.

A. Theme 1: The real condition of Physics Laboratory in Indonesia

The laboratory is a learning media for student activity. There are several conditions of the laboratory in Indonesia, from unfit conditions to use until good condition with complete tools and materials.



Figure 2. Unfit condition laboratory

The figure illustrates the physics laboratory after being hit by a natural disaster (Figure 2), which has not been repaired and remains in bad condition. The concern of school headmaster and teachers is needed to improve laboratory space to be better and more suitable to use. Building renovation needs to be done, for student learning activities can be maintained especially in science topics that require a laboratory as an interactive learning media to conducting laboratory activity.

Generally, high schools in Indonesia have a laboratory, especially in big cities. Each school has a different condition of the laboratory. If we compare the school laboratory to the university laboratory, such as fundamental physics laboratory, it is almost same with science or physics laboratory in high school. Usually, universities physics laboratory have more complete tools and better management.



Figure 3. Good condition and comfortable laboratory

Good management laboratory has good saving the tools, a large room, and regular tool storage will make it easier to conduct laboratory activities and control it. As figure out in

Figure 3 and Figure 4, tools setting is needed, the layout of each tool needs to be noticed. For example, to conducting electricity experiment using electric current, so have to close with stop contact or battery. Meanwhile, the laboratory should have storage cabinets for bags, to manage an object on the table of the experiment.



Figure 4. Excellent condition and comfortable laboratory with complete tools



Figure 5. Bag storage cabinets

Based on the interview process with teachers and students, the condition of the laboratory is useful but rarely used for laboratory activity. Although the physics curricula suggested the use of laboratory activity, it is only several topics that conduct laboratory activity. This is depending on the time and teacher management learning. Some teachers prefer to explain and activities in the class then conduct laboratory activity.

B. Theme 2: Inside the physics Laboratory

1. Topics

In this section, we focused on four topics for physics subject: mechanic, thermodynamic, optic, and electricity. Several students can do all the issues in laboratory activity with little guided by the teacher. But, a part of student can't do laboratory activity with their team. They always need guiding for each part in laboratory activity.

On mechanic topic, most students can do their activity with little guided. For the first step, teacher or assistant laboratory conducting laboratory activity for an example, and then continued by the student to do it as the teacher has done. The subtopics in a mechanic are density, free-fall motion, regular straight motion, circular motion, friction, oscillation, spring, Newton's law, the centre of mass, and pulley system. For mechanic topic, commonly in high school physics laboratory and university physics laboratory do all of subtopics mechanic, except the school that conducting laboratory activities one subtopic of each semester.

In thermodynamic topic, a little student can do perfectly to get good data, and another part can do laboratory activity with lots guided. In this topic, need a long time to conduct laboratory activity to get data. The thermodynamic topic usually conducted in the university laboratory. Therefore, it is a little high school that used this topic to carry out laboratory activity. Besides that, the teacher and assistant laboratory do not have a good patient to get the data; they have difficulty controlling the temperature. The subtopics of thermodynamics are the application of thermometers, heat types of solids, heat of melting, and calorimeter.

The easiest topic for conducting laboratory activity is optic. The subtopics of optic are light reflection, light refraction, light refraction, lenses, and diffraction grating optical instruments. With using a mirror or lens, the student can get the data. These sub-topics used in high school and basic physics laboratory in the university. For expand the concept, in physics Laboratory University used optic tool combine with computer-based data. The tools that used more expensive, so little high school which is has those tools.

Totally, woman physics teacher more than man physics teacher. Based on the interview, there are many woman physics teacher often to using electricity tools, although used low electric current most of them steal afraid to use the tools. The subtopic commonly using in high school are Multimeter, Ohm law, and Kirchhoff law. Meanwhile, in basic physics university laboratory using more than high school subtopics, as like wire type obstacles, Wheatstone bridges, RL and RC circuits.

2. Procedural

High school physics laboratory and university physics laboratory have a different procedure for conducting laboratory activity. In high school, the teacher gives several instructions and give an example and then student conducting laboratory activity likes teacher' have done. But, in university student get a pre-laboratory test. Lecturer or laboratory staff wants to know how students have mastered the use of tools, ways to get data and analysis. Need enough time to do the pre-laboratory test because the student should learn about the concept and use the tools for each topic.

Different level causes different behaviour to conduct an experiment. High school need to be guided inquiry each step to get the data but in the laboratory university only a few steps which needed the guide, because they have done the pre-laboratory test. There are several points for assessment in the university physics laboratory, (1) the ability to set tools correctly, (2) the ability to use and read the scale of the measuring instrument properly and (3) the cooperation among group members (Mubarok et al., 2018)).

After conducting a laboratory activity, the student should be finishing the report. For high school, the report of laboratory activity is combining with worksheet conducting laboratory activity. But, in university report of laboratory activity is different from the worksheet. The student should be writing from chapter one: introduction, chapter two: literature, chapter three: method, chapter four: data and analyses, chapter five: conclusion and references. The report should write each topic of laboratory activity.

3. Tools

The variations of laboratory tools and materials are helpful in the school condition, teachers and laboratory staff. The majority of favourite schools are better equipped; they can buy several laboratory tools as education media. But, depending on teacher and laboratory staff. Many schools have a good condition of the laboratory tools, but they are often to use, even the tools never used.

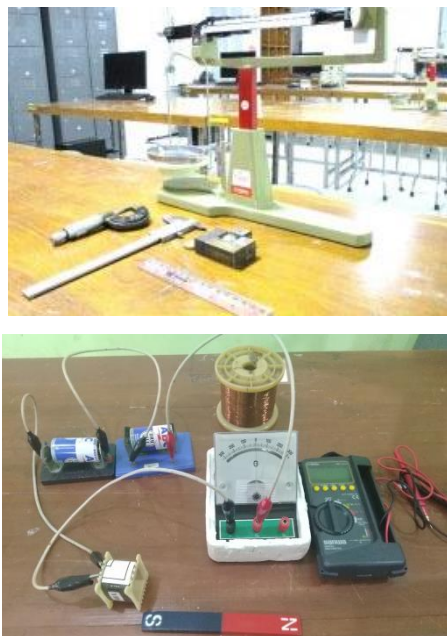


Figure 6. The tools are ready to be used

The good condition shows that the management laboratory is well. For example, likes Figure 6, there are several tools to measure the length and the mass of the object. The tools

are ready for using a measured object. Besides the tools that are ready at the table to conduct the laboratory activities, several tools and materials that are still stored as reserves, even if the ready tools are damaged, so they can use a backup tool as a substitute, like Figure 7.



Figure 7. Backup tools

Management tools are needed. There are three conditions of the tools, (1) ready to use, (2) reserves and (3) broken. If the condition of the tool is not considered, students will use an improper tool, often in laboratory activities, students use tools that are not functioning normally, especially measuring instruments, so that the data obtained is inaccurate. Figure 8 shows that three conditions of mass measurement tools (O'hauss). Besides, we need a variety of measurement tools, to compare the result data, where is the device which has proper calibration and level of accuracy (Figure 9).



Figure 8. Three conditions of the tools, (a) ready to use, (b) reserve and (c) broken



Figure 9. Good condition with complete tools

C. Theme 3: Physics experiment and theoretical approach- Student paradox in laboratory

Physics experiment and theoretical approach are inseparable things, like complementary currencies, as if they were separate, but they are one. Physics experiments are carried out in a laboratory or in nature, to find out the actual knowledge of physics directly. In addition to experimental activities, a theoretical approach is needed to provide students with full understanding. They understand the real physics experiment and the physical meaning of the

physics phenomenon. Additionally, they know the mathematical sense of data obtained from the physical aspects of investigations.



Figure 10. Physics learning in classroom



Figure 11. Physics laboratory activity

Figure 10 shows the learning activities in the classroom. In these activities, students discuss the physical and mathematical meaning of a phenomenon or physics experiment. Frederico and Gianotto (2017) underlined that the use of dual coding theory in physics engaged students in positive learning experiences. Through physics laboratory, students apply this theory either in theoretical physics or laboratory practice. While in Figure 11 is a physics experiment activity, laboratory activities that invite students to understand physics directly and strengthen the long-time memory stored in the brain. Because learning with laboratory activities or actual knowledge can be more easily remembered and stored in the right mind (Quas, Goodman, Bidrose, Pipe, & Craw, 1999).

Conclusion

The results of this study are that the physical laboratory conditions in Indonesia are relatively good, but the quantity of laboratory use is low. The topic of physics that often carries out laboratory activities is on mechanics. Besides, physics experiment and theoretical approach

are inseparable things, like complementary currencies, as if they were separate, but they are one. Physics experiments are carried out in a laboratory or in nature, to find out the actual knowledge of physics directly, and the theoretical approach is needed to provide students with full understanding.

Acknowledgment

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Submission of paper

1 message

Nadi Suprpto . <nadisuprpto@unesa.ac.id>

Wed, Oct 16, 2019 at 11:28 AM

To: 妮妮 <JSE_in_China@21cn.com>

Dear Editor of the Journal of Science Education,

As an author, I am interested to submit my article in your journal, entitled:
Indonesian Physics Laboratory: Learning Physics Concept through Photovoice

To understand the real laboratory, especially in a physics laboratory, we conducted laboratory activities by observing them through Participatory Action Research (PAR) as a research method. The role of PAR's member is a co-researcher and co-observer. Totally, 90 pre-service physics teacher from three classes in a public university in Surabaya contributed as PAR members. From these members of PAR, some data can be captured by using photovoice that it can be easier to describe the condition of the real physics laboratory. I believed the manuscript fulfil the criteria of your journal.

Let me know if any clarification and further steps.

Sincerely yours,

Nadi Suprpto, PhD
Universitas Negeri Surabaya, Indonesia



Nadi Suprpto_16102019_JSE.docx

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Dokumen pendukung luaran Tambahan #1

Luaran dijanjikan: Publikasi Ilmiah Jurnal Nasional Terakreditasi

Target: submitted

Dicapai: Published

Dokumen wajib diunggah:

1. Artikel yang terbit

Dokumen sudah diunggah:

1. Artikel yang terbit

Dokumen belum diunggah:

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PAPER

Essential Factors Influencing Preparation of Physics Laboratory in New Curriculum: Photo Voice Study

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Essential Factors Influencing Preparation of Physics Laboratory in New Curriculum: Photo Voice Study

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Abstract. This research was stimulated by the situation of Indonesian curriculum especially in physics that requiring the balancing between basic competence of knowledge and skills. Currently, the main problem is the basic competence of skills become the second orientation, therefore, it should be more attention. Physics laboratory is the essential room in supporting the implementation of new curriculum, K13. Through a qualitative study, this research used interview process to pre-service and in-service physics teachers in East Java Indonesia. Totally, 4 in-service physics teachers and 9 pre-service-physics teachers were invited in the semi-structured interview process by utilising photo voice approach. The research captured seven factors as well as the attitudes towards new physics curriculum, which categorised into: practical application, curriculum content, academic anxiety, need analysis, globalisation effect, assessment effect, and government policy. Meanwhile, each factor was implicated to other factors.

1. Introduction

Through a previous research, the first author explored the attitudes towards a New Physics Curriculum that resulting seven dimensions: “government policy, need analysis, assessment effect, globalisation effect, curriculum content, practical application, and academic anxiety” [1]. On the other hand, Indonesian new curriculum (K13) required the implementation both basic competences of knowledge and skills together. Permendikbud No. 21 of 2016 concerning Basic and Secondary Education Content Standards which contain the Level of Competence and Core Competencies in accordance with certain levels and types of education. Core Competencies include spiritual attitude, social attitude, knowledge and skills [2]. For knowledge domain, it is a well-implemented since previous curriculum due to the routine activities of physics teachers. As a proof, the evaluation during the process of learning is focused of this domain. In contrast, competences of skills usually assessed in practical examination after the student reach ninth grader for junior high school and twelfth graders for senior high schools. One of the reasons is about the existence of laboratory. This gap becomes concern in this research.

In fact, school laboratories are very important to support the teaching-learning process in schools. Nowadays, school laboratories are not only science laboratories [physics laboratories], there are also social studies, language and computer laboratories. However, it should be noted that the condition of the physics laboratory needs to be given special attention by the school management. The reason is, there are some problems that are often faced in physics laboratories. From the results of observations in some Senior High Schools in East Java, the fact is that the existence of physics laboratories in schools is sometimes not used as a function of place to carry out practical activities for students and management of related laboratories seem to be less than optimal. Some examples are the physics



laboratories used as classrooms and as a place for other activities that are not related to physics. Realizing the importance of facilities and infrastructure such as physics laboratories in supporting learning activities in schools, good management is needed by the school staff so that the utilisation of laboratories is carried out effectively.

Physics laboratory is the essential room in supporting the implementation of new curriculum. A laboratory is a place used by people to prepare something or carry out scientific activities. To explore the essential factors influencing the physics laboratory into K13, the study take into account the exploration more deeply. Finally, the research question of the study is “to what extend do pre-service and in-service physics teachers of experiencing the factors influencing preparation of physics laboratory in new physics curriculum?”

2. Methodology

Through a qualitative study, this research used interview process to pre-service and in-service physics teachers in East Java Indonesia [3-4]. Totally, 4 in-service physics teachers and 9 pre-service physics teachers were invited in the interview process by utilising photo voice approach [5-8]. Their roles in the research are being member of participatory action research (PAR). We used a pseudonym of author name for ethical academic. The distribution of participant is depicted in Table 1.

Table 1. Participants of the research.

Pseudonym	Status	Age
Jono	in-service physics teacher (ISPT)	27
Tini	ISPT	42
Arif	ISPT	24
Yuni	ISPT	24
Rahayu	pre-service physics teacher (PSPT)	20
Suci	PSPT	20
Harti	PSPT	19
Fais	PSPT	20
Firda	PSPT	20
Hendra	PSPT	20
Lydia	PSPT	21
Siti	PSPT	20
Ais	PSPT	20

Through the-semi-structured interview process, the participants were assigned their response of factors relating to preparation of laboratory though a photo-captured then giving the description with some sentences [9-10]. The data analysis process used in this research was manual coding, in which the theme was categorised into the appropriate theme according the research question and previous findings. Photo voice is one of the many participatory studies applied in education [5,7,8]. This technique was first introduced as Photo novella by Wang and Burris in 1994, is a methodology that allows individuals to reflect the strength of their community [7]. One of the goals of the photo voice technique is to develop critical reasoning from participants [5].

3. Results and Discussion

Based on the data analysis process, this research resulting seven factors/ themes as follow.

a. Theme 1: Practical application

The following are some experiencing of participants in relating to the theme practical application.



Figure 1. A snapshot of my school physics laboratory [Rahayu].

“Physics laboratory is a place to prove or test the truth of a physical theory with empirical reality data (both quantity and quality)”. [Arif]

“For experiments to be carried out in a laboratory, the laboratory must be equipped with adequate equipment. This means that the tools available must have functions that support the implementation of the laboratory. What is needed as tools that work well, measure which must be measured and the measurement of the measured quantity must be trusted. Procurement of tools in a laboratory must be adjusted to the objectives of the laboratory itself”. [Rahayu]

According to Richard (2013: 116), the physics laboratory functions are as follows: a. strengthen understanding of the physics concept, both for students (participants in the laboratory collaboration) or for physics teachers; b. foster interest, inspiration, motivation and confidence in learning IPA; c. strengthening the imagination of students and all individuals involved in science laboratory activities, triggering inspiration, and can develop the creativity of participants in conducting experiments on science learning materials; d. practicing experimental skills; e. developing the ability of researchers to make decisions in judgment theory or experimentation; and f. a forum to correct opinions or misconceptions about lessons or theories in the Natural Science [11].

b. Theme 2: Curriculum content

Regarding the theme of curriculum content some participant gave their arguments.

3.2 Menerapkan prinsip-prinsip pengukuran besaran fisis, ketepatan, ketelitian dan angka penting, serta notasi ilmiah	4.2 Menyajikan hasil pengukuran besaran fisis berikut ketelitiannya dengan menggunakan peralatan dan teknik yang tepat serta mengikuti kaidah angka penting untuk suatu penyelidikan ilmiah
3.3 Menerapkan prinsip penjumlahan vektor sebidang (misalnya perpindahan)	4.3 Merancang percobaan untuk menentukan resultan vektor sebidang (misalnya perpindahan) beserta presentasi hasil dan makna fisisnya
3.4 Menganalisis besaran-besaran fisis pada gerak lurus dengan kecepatan konstan (tetap) dan gerak lurus dengan percepatan konstan (tetap) berikut penerapannya dalam kehidupan sehari-hari misalnya keselamatan lalu lintas	4.4 Menyajikan data dan grafik hasil percobaan gerak benda untuk menyelidiki karakteristik gerak lurus dengan kecepatan konstan (tetap) dan gerak lurus dengan percepatan konstan (tetap) berikut makna fisisnya
3.5 Menganalisis gerak parabola dengan menggunakan vektor, berikut makna fisisnya dan penerapannya dalam kehidupan sehari-hari	4.5 Mempresentasikan data hasil percobaan gerak parabola dan makna fisisnya
3.6 Menganalisis besaran fisis pada gerak melingkar dengan laju konstan (tetap) dan	4.6 Melakukan percobaan berikut presentasi hasilnya tentang gerak melingkar, makna fisis dan

Figure 2. K 13 contains two competencies which are taught at the same time; the left column of knowledge, the right column of skills [Jono].

“Based on the picture we know that, KD 3....represents the competence of knowledge, meanwhile KD 4...implies the competence of skills, so why laboratory is important in successful of KD 4”. [Jono]

“.....One of the reasons why a test is carried out on a model or theory in a laboratory, because events, natural and surrounding phenomena are difficult to find and cannot be observed closely, and are difficult to observe because of the limited time or too fast for the individuals”. [Ais]

If talking about idealism, then physics learning should emphasise the content and its process, namely learning that emphasizes more on the way of thinking science to observe the circumstances around, then think of the relationship of the consequences, then do modeling and finally be able to do engineering in the work. If it is simplified, learning physics is essentially recognizing naturals around then making a product formulation in the form of formulas and correct attitudes towards these phenomena [12].

c. Theme 3: academic anxiety

Turning to the theme of academic anxiety, some participant gave their arguments.



Figure 3. My dream of a virtual physics laboratory [Hendra].

“My school **does not have a laboratory** but has a **dream** of optimizing a virtual laboratory” [Hendra]

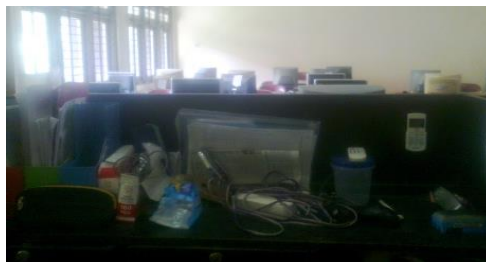


Figure 4. The condition of my lab [Yuni].

“....this is the condition of my laboratory; **I am very worried about it**, especially before the practical exam or even school accreditation” [Yuni].

d. Theme 4: need analysis

The following are the participant opinions in relating to the need analysis of physics laboratory.

“In our opinion, the physics laboratory is useful due to the reasons as follows: a). The laboratory can be a container, that is a place, a building space with all kinds of equipment needed for scientific activities. In this case laboratories are seen as hardware. 2). Laboratories can be a media tool where teaching and learning activities are carried out. In this sense, the laboratory is seen as software in scientific activities. 3). Laboratory can be interpreted as a center of information. With the facilities and infrastructure that are owned by all laboratories, scientific activities and experimentation can be carried out. In terms of performance, the laboratory is a place where work activities are carried out to produce something. In this case in the technical field, laboratories here can be interpreted as workshops” [Fais and firda].

Additionally, according to participants, through laboratory, students could create scientific attitude, they will get clarity of concepts, visualization of concepts. As a medium to foster critical reasoning at students in schools, they are able to reason and think scientifically, so that they will become world scientific candidates.

e. Theme 5: globalization effect

The following section is the participant opinions in relating to globalization effect that affected to the preparation of physics laboratory to new curriculum.

“...in the industrial era 4.0, all objects around us can be used as physics laboratories”. [Tini]

“...for example, learning physics from nature is an example of a physics laboratory from the contextual setting”. [Harti]

“STEM-based physics learning can also be done outside the classroom, for example in museum, tourism site, attractions, techno parks, or science centres”. [Suci]

“Students can use virtual physics laboratories from PhET or facilities on their android as a form of internet application of things (IoT)”. [Lydia]

In regards to globalization, the word of place is the main concern of the physics laboratory should be. The place in question can be a closed room commonly referred to as a laboratory building or laboratory room, it can also be an open place such as a garden, forest, or universe. The existence and condition of a laboratory depends on the intended use of the laboratory, the role or function to be given to the laboratory, and benefits to be taken from the laboratory. Various laboratories recognized today include industrial laboratories in the world of business and industry, hospital laboratories and clinical laboratories in the world of health, research laboratories in the world of science and technology, as well as laboratories in universities and in schools in the world of education. In the following description, it will only be stated about the physics laboratory in the school [13]. The laboratory is a place where experiments and investigations are conducted [14].

f. Theme 6: assessment effect

The following part is the participant opinions in relating to assessment effect that affected to the preparation of physics laboratory to new curriculum.

At present, even though the skills test for KD 4 is rarely conducted by teachers, in fact every school always does a practical exam at the end of the year after national examination [Siti].



Figure 5. A practical examination of physics for twelfth grader [Siti].

Many factors that cause the shift of the laboratory as a place to observe, find, and solve a problem into a classroom [15]: lack of ability to manage school laboratories; and lack of understanding of the meaning and function of school laboratories and its implications for the development and improvement of the science learning system. The synchronization of the existence of school laboratories is considered to be burdensome so that it is rarely used as it should be. The ability and mastery of teachers on equipment and use of materials is still inadequate. Lack of quality and quantity of laboratory personnel is inadequate and the material resulted in not every student having the opportunity to learn to conduct an experiment.

g. Theme 7: government policy

“One of the standards of education is the standard facilities and infrastructure in which physics laboratories must be satisfied to meet the demands of the curriculum”. [Harti]

Meanwhile, Jono gives his opinion in terms of government policy.

“In my opinion, to succeed in curriculum 13, especially in physics, the government must facilitate laboratory facilities to meet quality standards”. [Jono]

All the themes above have a closed relationship each other and can be conceived through Figure 6.

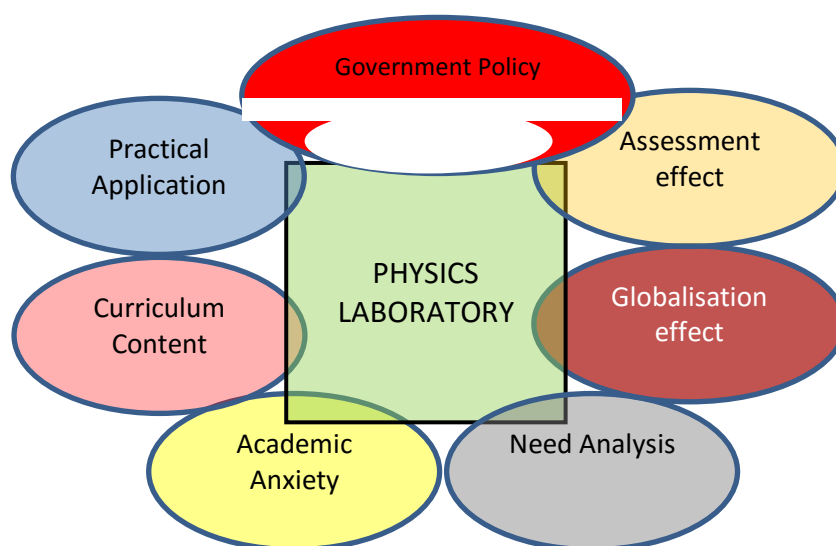


Figure 6. The factors influencing preparation of physics laboratory in new physics curriculum.

4. Conclusion

The research captured seven factors influencing preparation of physics laboratory in new physics curriculum, which categorised into: practical application, curriculum content, academic anxiety, need analysis, globalisation effect, assessment effect, and government policy. Meanwhile, each factor was implicated to other factors. By capturing the picture and giving the meaning through a photo voice project, the participants aware the essence of meaning in qualitative research. They took into account their position as being member of participatory action research.

Acknowledgments

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