Bidang Fokus Penelitian: Sosial Humaniora-Sosial Budaya-Pendidikan

LAPORAN AKHIR TAHUN PERTAMA
PENELITIAN DASAR

UNESA
Universitas Negeri Surabaya

Reorientasi Riset Pendidikan Fisika di Indonesia Berdasarkan Hasil Pemetaan Tren Riset Berbasis Database Scopus dan Web of science dengan Bibliometric Analysis

Penelitian ini Dibiayai oleh :
Direktorat Jenderal Penguatan Riset dan Pengembangan Kementrian Riset, Teknologi, dan Pendidikan Tinggi
Nomor : 407/UN38/HK/PP/2021
Tanggal : 18 Maret 2021

Nadi Suprapto, S.Pd., M.Pd., Ph.D. (Ketua Tim) NIDN 0012068102
Dr. Binar Kurnia Prahani, M.Pd. (Anggota Tim) NIDN 0013059004
Utama Alan Deta, M.Pd., M.Si. (Anggota Tim) NIDN 0017038901

UNIVERSITAS NEGERI SURABAYA
LEMBAGA PENELITIAN & PENGABDIAN KEPADA MASYARAKAT
2021

HALAMAN PENGESAHAN
PENELITIAN DASAR

Judul Penelitian	: Reorientasi Riset Pendidikan Fisika di Indonesia Berdasarkan Hasil Pemetaan Tren Riset Berbasis Database Scopus dan Web of science dengan Bibliometric Analysis
Kode/Nama Rumpun Ilmu	: 773 / Pendidikan Fisika
Bidang Fokus Penelitian	: Sosial Humaniora - Seni Budaya - Pendidikan
Ketua Peneliti	
a. Nama Lengkap	: Nadi Suprapto, S.Pd., M.Pd., Ph.D
b. NIDN	: 0012068102
c. Jabatan Fungsional	: Lektor Kepala
d. Program Studi	: Pendidikan Fisika
e. Nomor HP	: 081332334242
f. Alamat surel (e-mail)	: nadisuprapto@unesa.ac.id
Anggota Peneliti (1)	
a. Nama Lengkap	: Dr. Binar Kurnia Prahani, M.Pd.
b. NIDN	: 0013059004
c. Perguruan Tinggi	: Universitas Negeri Surabaya
Anggota Peneliti (2)	
a. Nama Lengkap	: Utama Alan Deta, M.Pd., M.Si.
b. NIDN	: 0017038901
c. Perguruan Tinggi	: Universitas Negeri Surabaya
Institusi Mitra	
a. Nama Institusi Mitra	: -
b. Alamat	: -
c. Penanggung Jawab	: -
Lama Penelitian Keseluruhan	: 2 tahun
Biaya Penelitian Tahun ke-1	: Rp. 86.440.000,-
Biaya Penelitian Keseluruhan	: Rp. 171.400.000,-

Surabaya, 15 Nopember 2021

Mengetahui
Dekan FMIPA

Prof. Dr. Madlazim, M.Si
NIP. 196511051991031012

Ketua Peneliti

Nadi Suprapto, S.Pd., M.Pd., Ph.D
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Menyetujui
Ketua LPPM

Prof. Dr. Darni, M.Hum
NIP. 196509261990022001

LAPORAN KEMAJUAN PENELITIAN MULTI TAHUN

ID Proposal: 1870dcb3-de54-418f-927b-9891020a1162
Laporan Kemajuan Penelitian: tahun ke-1 dari 2 tahun

1. IDENTITAS PENELITIAN

A. JUDUL PENELITIAN

Reorientasi Riset Pendidikan Fisika di Indonesia Berdasarkan Hasil Pemetaan Tren Riset Berbasis Database Scopus dan Web of science dengan Bibliometric Analysis

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 Desk Study Dalam Negeri	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	9
Dr. BINAR KURNIA PRAHANI S.Pd, M.Pd Anggota Pengusul 1	Universitas Negeri Surabaya	Pendidikan Fisika	Penanggungjawab pelaksana dalam pelaksanaan desk study (eksplorasi database Scopus; Pengklasteran data; dan Visualisasi)	6689659	7
UTAMA ALAN DETA S.Pd, M.Pd, M.Si Anggota Pengusul 2	Universitas Negeri Surabaya	Pendidikan Fisika	Pelaksana desk study (pengklasteran bertingkat; analisis facet; dan visualisasi data) dan penyusunan Buku Ajar: Tren Riset Penelitian Pendidikan Fisika	74761	6

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

4. LUARAN DAN TARGET CAPAIAN

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	Artikel di Jurnal Internasional Terindeks di Pengindeks Bereputasi	Accepted	Journal of Turkish Science Education

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	Artikel pada Conference/Seminar Internasional di Pengindeks Bereputasi	Terbit dalam Prosiding	URICSE Riau 2021
1	Buku referensi	Terbit ber ISBN	JSDS
1	Artikel di Jurnal Nasional terakreditasi peringkat 1-3	Accepted	Jurnal Penelitian Fisika dan Aplikasinya

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. 180,840,000

Tahun 1 Total Rp. 86,440,000

Jenis Pembelanjaan	Item	Satuan	Vol.	Biaya Satuan	Total
Analisis Data	HR Pengolah Data	P (penelitian)	11	900,000	9,900,000
Analisis Data	Uang Harian	OH	90	100,000	9,000,000
Analisis Data	Transport Lokal	OK (kali)	90	100,000	9,000,000
Analisis Data	Biaya konsumsi rapat	OH	90	45,000	4,050,000
Bahan	ATK	Paket	123	100,000	12,300,000
Pelaporan, Luaran Wajib, dan Luaran Tambahan	Biaya seminar internasional	Paket	1	3,000,000	3,000,000
Pelaporan, Luaran Wajib, dan Luaran Tambahan	Publikasi artikel di Jurnal Internasional	Paket	1	9,740,000	9,740,000
Pelaporan, Luaran Wajib, dan Luaran Tambahan	Luaran KI (paten, hak cipta dll)	Paket	2	500,000	1,000,000
Pelaporan, Luaran Wajib, dan Luaran Tambahan	HR Sekretariat/Administrasi Peneliti	OB	8	300,000	2,400,000
Pelaporan, Luaran Wajib, dan Luaran Tambahan	Uang harian rapat di dalam kantor	OH	45	100,000	4,500,000
Pelaporan, Luaran Wajib, dan Luaran Tambahan	Biaya konsumsi rapat	OH	45	45,000	2,025,000
Pelaporan, Luaran Wajib, dan Luaran Tambahan	Biaya penyusunan buku termasuk book chapter	Paket	50	80,000	4,000,000
Pengumpulan Data	Transport	OK (kali)	45	150,000	6,750,000

Jenis Pembelanjaan	Item	Satuan	Vol.	Biaya Satuan	Total
Pengumpulan Data	Uang Harian	OH	45	150,000	6,750,000
Pengumpulan Data	Biaya konsumsi	OH	45	45,000	2,025,000

Tahun 2 Total Rp. 94,400,000

Jenis Pembelanjaan	Item	Satuan	Vol.	Biaya Satuan	Total
Analisis Data	HR Pengolah Data	P (penelitian)	12	900,000	10,800,000
Analisis Data	Uang Harian	OH	90	100,000	9,000,000
Analisis Data	Transport Lokal	OK (kali)	90	100,000	9,000,000
Analisis Data	Biaya konsumsi rapat	OH	90	45,000	4,050,000
Bahan	ATK	Paket	100	145,000	14,500,000
Pelaporan, Luaran Wajib, dan Luaran Tambahan	Biaya seminar internasional	Paket	1	3,000,000	3,000,000
Pelaporan, Luaran Wajib, dan Luaran Tambahan	Publikasi artikel di Jurnal Internasional	Paket	1	10,425,000	10,425,000
Pelaporan, Luaran Wajib, dan Luaran Tambahan	Luaran KI (paten, hak cipta dll)	Paket	2	500,000	1,000,000
Pelaporan, Luaran Wajib, dan Luaran Tambahan	HR Sekretariat/Administrasi Peneliti	OB	8	300,000	2,400,000
Pelaporan, Luaran Wajib, dan Luaran Tambahan	Biaya penyusunan buku termasuk book chapter	Paket	50	120,000	6,000,000
Pelaporan, Luaran Wajib, dan Luaran Tambahan	Uang harian rapat di dalam kantor	OH	60	100,000	6,000,000
Pelaporan, Luaran Wajib, dan Luaran Tambahan	Biaya konsumsi rapat	OH	60	45,000	2,700,000
Pengumpulan Data	Transport	OK (kali)	45	150,000	6,750,000
Pengumpulan Data	Uang Harian	OH	45	150,000	6,750,000
Pengumpulan Data	Biaya konsumsi	OH	45	45,000	2,025,000

6. KEMAJUAN PENELITIAN

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

Tugas dosen sesuai dengan tri dharma pendidikan adalah mengajar, meneliti, dan mengabdi, selain tugas-tugas pendukung lainnya. Saat ini, kewajiban meneliti bagi dosen diikuti dengan kewajiban publikasi di jurnal bereputasi maupun prosiding bereputasi merupakan suatu keharusan. Salah satu lembaga pengindeks jurnal yang popular dan dijadikan acuan adalah Scopus dan Web of Science (WOS) database yang dilengkapi dengan laboratorium akademiknya: Scimagojr dan webofknowledge. Para peneliti di Indonesia termasuk didalamnya adalah peneliti Pendidikan Fisika adalah bagian dari peneliti dunia dituntut untuk berkontribusi dalam era publikasi ini, sebagaimana ungkapan yang sudah mendunia: publish or perish [publikasi atau tidak sama sekali].

Sejauhmana kontribusi peneliti-peneliti dalam bidang Pendidikan Fisika di Indonesia perlu dipetakan untuk mengevaluasi keberhasilan-keberhasilan maupun tantangan-tantangan yang dihadapi dalam proses publikasi ke dalam jurnal bereputasi. Sehingga diperlukan pembanding berupa kerangka riset pendidikan sains (fisika) yang sudah dihasilkan oleh beberapa asosiasi dunia, misalnya NARST, ASERA, ESERA, dan EASE. Hasil dari proses pemetaan ini ditujukan untuk reorientasi riset Pendidikan Fisika di Indonesia ke depannya: bagian mana yang perlu dipertajam, topik mana yang harus ditekuni, dan seterusnya.

Penelitian ini dirancang untuk durasi multi tahun (tahun 2021-2022) dengan orientasi pada

pemetaan penelitian Pendidikan Fisika di Indonesia (2021) untuk tahun pertama dan Penelitian Pendidikan Fisika dibandingkan dunia global (2022) untuk tahun kedua, termasuk perbandingan penelitian Pendidikan Fisika di Indonesia dibandingkan dengan strand, tema atau topik yang dianjurkan oleh beberapa asosiasi tersebut di atas. Fokus penelitian yang dioperasionalkan dalam tujuan penelitian meliputi 10 parameter yang diteliti, yaitu: (1) jumlah artikel yang dihasilkan; (2) tantangan yang dihadapi peneliti Pendidikan Fisika Indonesia; (3) sebaran rumpun ilmu pengetahuan dari artikel-artikel yang dihasilkan; (4) tipe-tipe penelitian yang dihasilkan; (5) topik-topik penelitian yang dihasilkan; (6) top level artikel (Q1) yang dihasilkan; (7) artikel Pendidikan Fisika yang paling banyak disitasi; (8) produktivitas penulis; (9) distribusi afiliasi di antara peneliti Pendidikan Fisika dalam jurnal terindeks Scopus dan WOS; dan (10) model orientasi riset pendidikan fisika ke depannya.

Metode penelitian yang digunakan adalah Bibliometric Analysis yang meliputi 7 langkah: segmentasi dokumen, pendeteksian kesamaan, pengklasteran bertingkat, pelabelan klaster, analisis facet, dan visualisasi. Teknik pengumpulan data menggunakan desk study dengan log in ke laman http://www.scopus.com dan https://apps.webofknowledge.com/dengan mengikuti alur 7 langkah tersebut. Analisis data yang digunakan adalah deskriptif-kuantitatif dan diikuti oleh Multi-dimensional Scaling (MDS) (i.e. VosViewer dan Scimath) untuk mempresentasikan hasil pemetaan.

Luaran penelitian yang telah dihasilkan meliputi publikasi artikel di jurnal internasional bereputasi Q2 sebagai luaran wajib (published). Adapun untuk luaran tambahan meliputi: publikasi artikel di jurnal internasional bereputasi Q2 (published), jurnal nasional Sinta 2 (published), artikel di JPCS sebagai hasil international conference dan nasional conference (accepted), serta buku hasil penelitian yang ber-ISBN (published). Semua luaran ini secara rinci dapat dilihat dibagian isi laporan kemajuan ini.

B. KATA KUNCI: Tuliskan maksimal 5 kata kunci.

Reorientasi; tren penelitian; Pendidikan Fisika; Scopus; Web of Science

Pengisian poin C sampai dengan poin H mengikuti template berikut dan tidak dibatasi jumlah kata atau halaman namun disarankan seringkas 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 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 seringkas 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.

Penelitian ini telah menjawab pertanyaan-pertanyaan penelitian yang diajukan diproposal dengan konteks utama pemanfaatan analisis bibliometrik. Orientasi penelitian yang telah dilakukan adalah meliputi 10 hal utama:

1. Eksplorasi jumlah artikel yang dihasilkan oleh peneliti Pendidikan Fisika Indonesia di dalam database Scopus dan WOS.
2. Identifikasi tantangan yang dihadapi peneliti Pendidikan Fisika Indonesia dalam menerbitkan artikel mereka di jurnal terindeks Scopus dan WOS.
3. Eksplorasi sebaran rumpun ilmu dari artikel-artikel yang dihasilkan oleh peneliti Pendidikan Fisika Indonesia.
4. Identifikasi tipe-tipe penelitian yang dihasilkan oleh peneliti Pendidikan Fisika Indonesia.
5. Analisis ragam topik-topik penelitian yang dihasilkan oleh peneliti Pendidikan Fisika Indonesia yang telah diterbitkan.
6. Identifikasi artikel teratas (Q1) yang dihasilkan oleh peneliti Pendidikan Fisika Indonesia.
7. Analisis sitasi artikel Pendidikan Fisika yang terpublikasi di jurnal terindeks Scopus dan WOS.
8. Analisis produktivitas penulis dalam publikasi jurnal Scopus dan WOS.
9. Identifikasi distribusi afiliasi di antara peneliti Pendidikan Fisika di Indonesia berbasis database Scopus dan WOS.

Semua masalah tersebut **telah dijawab** oleh tim peneliti dan didistribusikan ke dalam luaran wajib dan luaran tambahan. Sebagai contoh untuk luaran wajib dan tambahan berupa artikel publikasi di jurnal internasional dan nasional. Khusus luaran tambahan berupa artikel di nasional dan internasional conference, buku referensi dengan judul "Analisis bibliometrik dalam pendidikan 2021" dan didiseminasikan dalam seminar internasional sebagai *invited speaker*. Selain itu telah dikembangkan video tutorial terkait analisis bibliometric di channel Youtube ketua peneliti dilaman berikut ini:

https://www.youtube.com/watch?v=fGWsnr3PKWE&list=PLugRDQL0fj36AIhViGBS3JGLRnFIGnr6h

Luaran tambahan yang diperoleh **telah melebihi target yang direncanakan** dalam proposal penelitian. Ke depannya fokus riset adalah mendesain model orientasi riset pendidikan fisika ke depannya serta membandingkan Penelitian Pendidikan Fisika Indonesia dengan dunia global pada tahun 2022.

Penelitian yang dilakukan oleh tim peneliti **memayungi proyek riset mahasiswa Pendidikan Fisika** khususnya pemrogram mata kuliah **Literasi Fisika** dan mahasiswa **pemrogram skripsi** bimbingan tim peneliti. Orientasi dari mata kuliah tersebut dan konteks skripsinya adalah analisis bibliometrik dalam bidang Pendidikan Fisika. Ketiga tim peneliti juga mengampu mata kuliah tersebut dan telah dihasilkan sekitar 20 draft artikel (sebagian sudah disubmit, sebagian under review, dan sebagian published). Berikut adalah beberapa bukti artikel yang sudah terbit:

1. *Ten Years of Research on History of Science (Physics): A Bibliometric Analysis*, dengan penulis Eva Ayu Yanuarti dan **Nadi Suprapto**, dengan laman https://scie-journal.com/index.php/SiPoSE/article/view/66
2. *Project-Based Learning (PjBL)-STEM: Bibliometric Analysis and Research Trends (2016-2020)* dengan penulis Maharani Ayu Nurdiana Erina Putri, Erina Krisnaningsih, **Nadi Suprapto**, **Utama Alan Deta**, and Dwikoranto, Berkala Ilmiah Pendidikan Fisika, Vol 9 No 3 tahun 2021, hal 368-380. https://ppjp.ulm.ac.id/journal/index.php/bipf
3. *Bibliometric Analysis of Multi Representation Based on Problem-Solving Skills Using VOSviewer* dengan penulis Erina Krisnaningsih, Maharani Ayu Nurdiana Putri, Tsabitamia Irba, **Nadi Suprapto,**

Utama Alan Deta, and Eko Hariyono, Berkala Ilmiah Pendidikan Fisika Vol 9 No 3 tahun 2021 , hal 274-284, https://ppjp.ulm.ac.id/journal/index.php/bipf

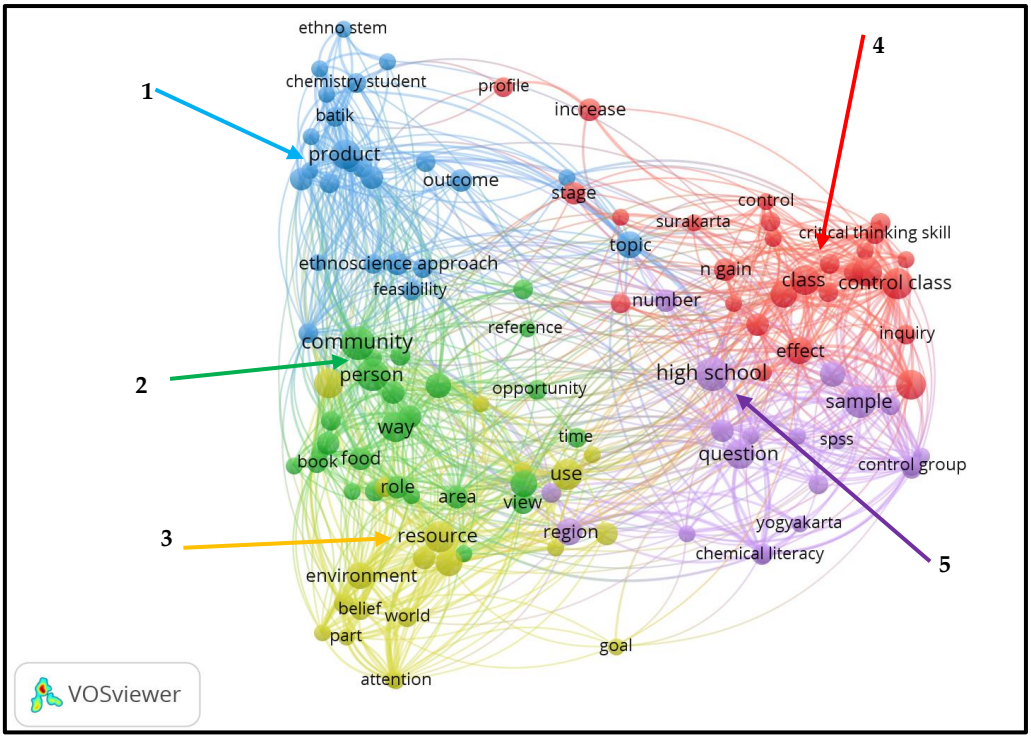
4. *Development of Physics Comic 'History of Physics Series: The Development of Atom*' oleh Maharani Ayu Nurdiana Putri*, Anggi Aulidhia Rohmah, Aretha Patricia Andriani, **Nadi Suprapto**, and Setyo Admoko, Berkala Ilmiah Pendidikan Fisika, Vol 9 No 3 2021 hal 298-305, https://ppjp.ulm.ac.id/journal/index.php/bipf

Tim peneliti juga memperoleh hak menyadur buku panduan penggunaan VOSViewer dan Scimat dalam versi Indonesia, sebagai bagian yang tak terpisahkan dalam luaran buku yang dihasilkan dan sangat penting bagi peneliti bibliometrik di Indonesia.

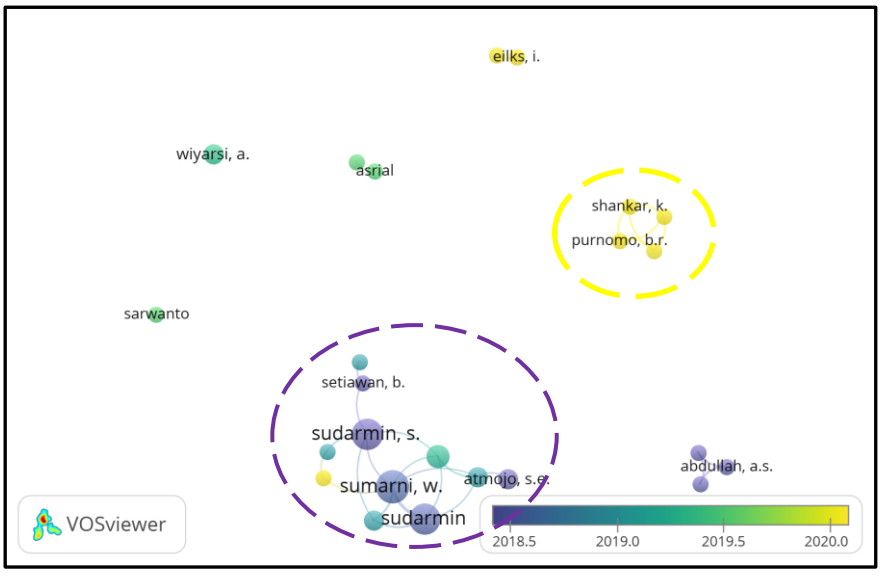
Gambar 1. Ilustrasi panduan software *Scimat* dan *VOSViewer* yang sudah dikembangkan dalam versi Indonesia oleh tim peneliti

Hasil rinci penelitian dapat dieksplore lebih jauh di setiap luaran wajib dan tambahan yang sudah direalisasikan.

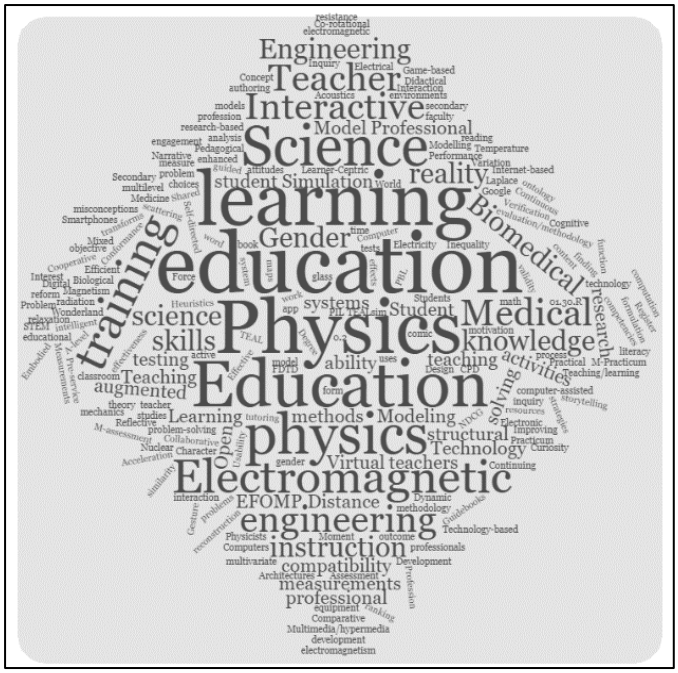
Berikut ini adalah beberapa sampel hasil penelitian:



Gambar 2. Contoh hasil visualisasi dengan VOSViewer untuk riset terkait ethnoscience dan ethnophysics oleh peneliti Indonesia dalam kurun waktu 2011-2020.



Gambar 3. Contoh visualisasi top author atau top peneliti Indonesia terkait riset tentang ethnoscience dengan bibliometric analisis dan co-authorships map



Gambar 4. Contoh visualisasi *keywords*

Hasil penelitian secara rinci dan detail dapat dieksplore lebih jauh di luaran wajib dan luaran tambahan yang sudah 100 persen direalisasikan di bagian D berikut ini.

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 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)
2021	Artikel di Jurnal Internasional Terindeks di Pengindeks Bereputasi Judul: *Top 100 Cited Publications in Physics Education in The last Thirty Years: A Bibliometric Analysis*	Published	Library Philosophy and Practice (Q2) https://digitalcommons.unl.edu/libphilprac/5928/
2021	Artikel di Jurnal Internasional Terindeks di Pengindeks Bereputasi Judul: *Research Trend on Ethnoscience through Bibliometric Analysis (2011-2020) and The Contribution of Indonesia*	Published	Library Philosophy and Practice (Q2) https://digitalcommons.unl.edu/libphilprac/5599/

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)
2021	Artikel pada Conference/Seminar Internasional di Pengindeks Bereputasi Judul: *Research Trend on Physics Studies in the Qur'an Through Bibliometric Analysis During 2016-2020*	accepted	Nama conference MISEIC 2021 akan diterbitkan di Journal of Physics Conference Series terindeks oleh Scopus
2021	Artikel pada Conference/Seminar Internasional di Pengindeks Bereputasi Judul: *Research on physics of photography: A bibliometric study (2000-2020)*	accepted	Nama conference SNF 2021 akan diterbitkan di Journal of Physics Conference Series terindeks oleh Scopus
2021	Buku referensi Terbit ber ISBN: **Analisis bibliometrik dalam pendidikan 2021** Authors: Nadi suprapto, Binar kurnia prahani, Utama Alam Deta; editor, Tim Kun Fayakun	Published	https://isbn.perpusnas.go.id/Account/SearchBuku?searchTxt=Analisis+bibliometrik+dalam+pendidikan+2021&searchCat=Judul Penerbit Kun Fayakun ISBN 978-623-343-560-4
2021	Artikel di Jurnal Nasional terakreditasi peringkat 1-3 Judul: *Research Trend of Socio Scientific Issues (SSI) in Physics Learning Through Bibliometric Analysis in 2011-2020 using Scopus Database and the Contribution of Indonesia*	Published	https://jppipa.unram.ac.id/index.php/jppipa/article/view/862 Jurnal Penelitian Pendidikan IPA, Universitas Mataram (SINTA 2)
2021	Invited Speaker dengan judul ***Twenty Years Research on Philosophy of Science: A Note of Physics Educator***	Presented	https://www.unimed.ac.id/events/the-8th-annual-international-seminar-on-trends-in-science-and-science-education-2021/
2021	Tutorial Youtube: Analisis Bibliometrik	Published	https://www.youtube.com/watch?v=fGWsnr3PKWE&list=PLugRDQL0fj36AIhViGBS3JGLRnFIGnr6h

BUKTI-BUKTI

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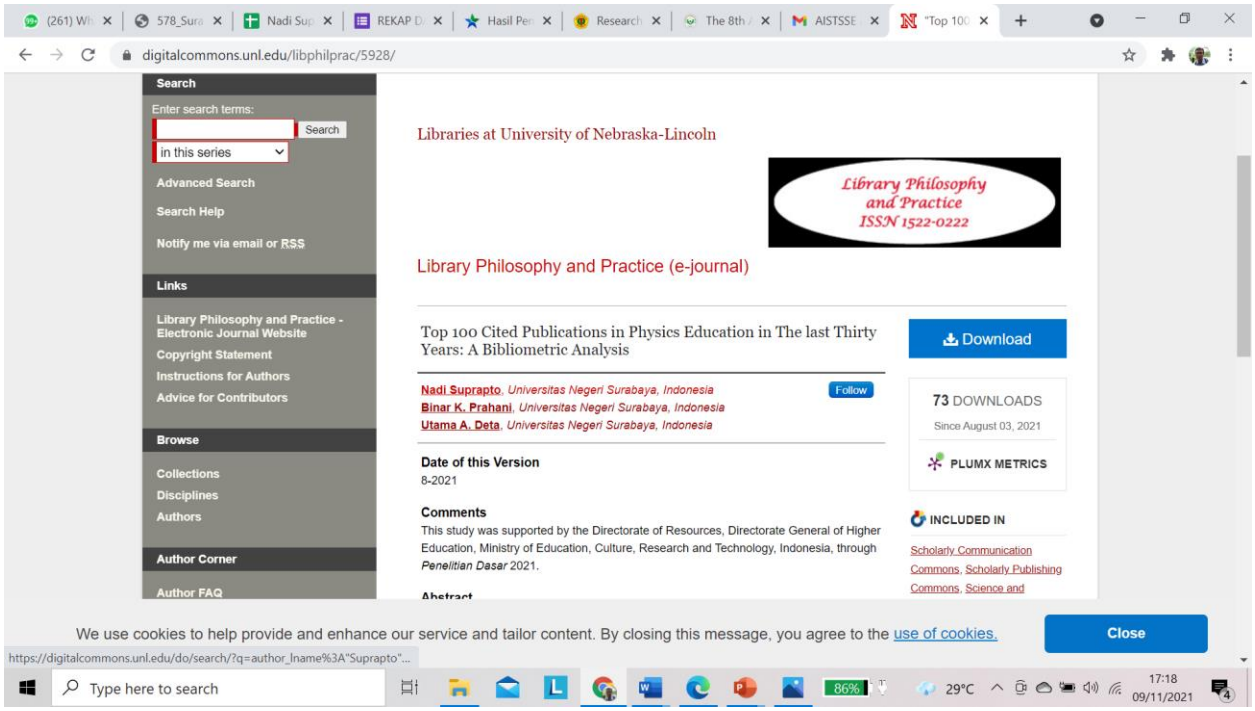

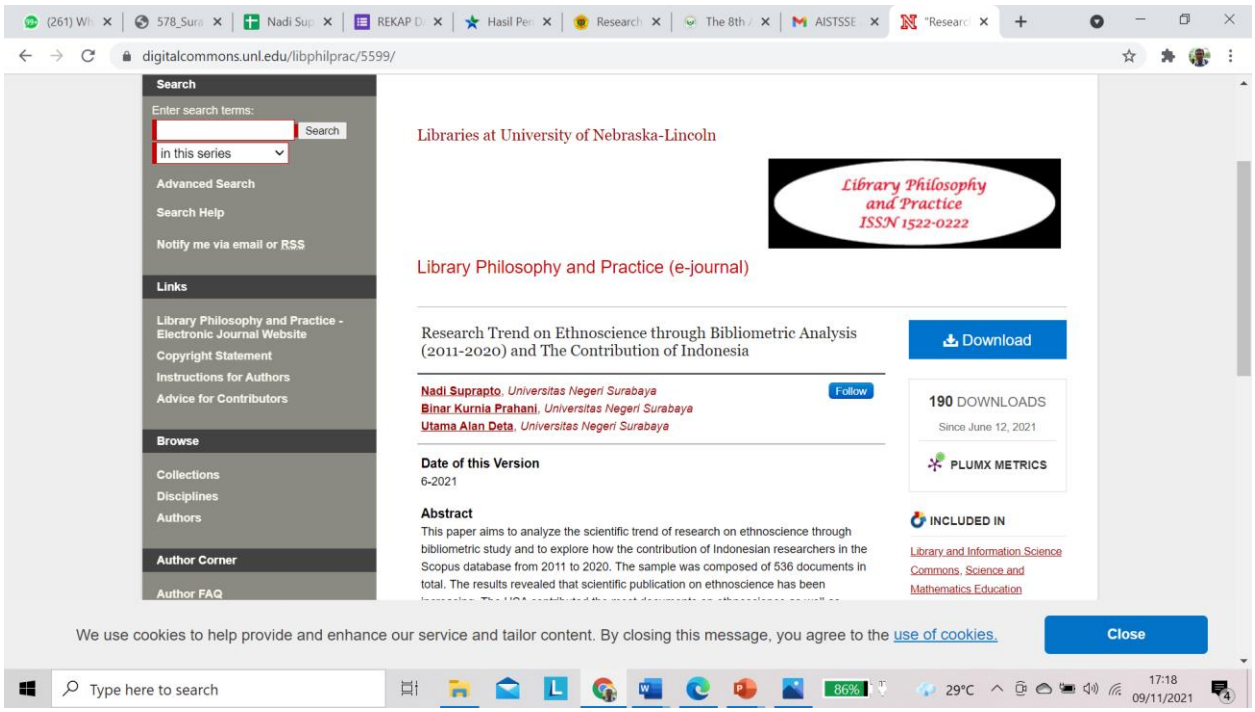

Research Trend of Socio Scientific Issues (SSI) in Physics Learning Through Bibliometric Analysis in 2011-2020 using Scopus Database and the Contribution of Indonesia

Utama Alan Deta , Arika Arika , Dhila Linggar Lentika , Sayyidah Annimatus Sa'diyah Al Lathifah , Suliyanah Suliyanah , Setyo Admoko , Nadi Suprapto

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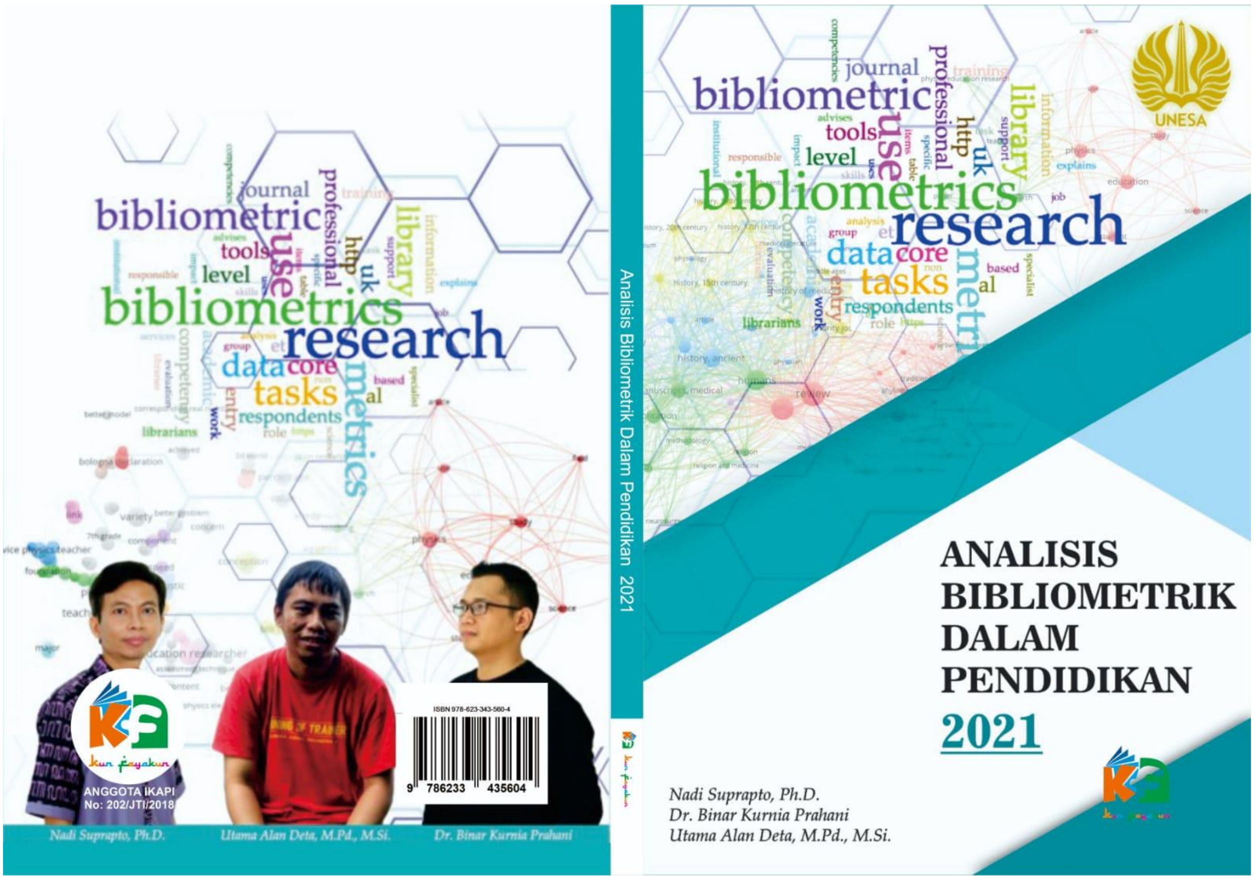

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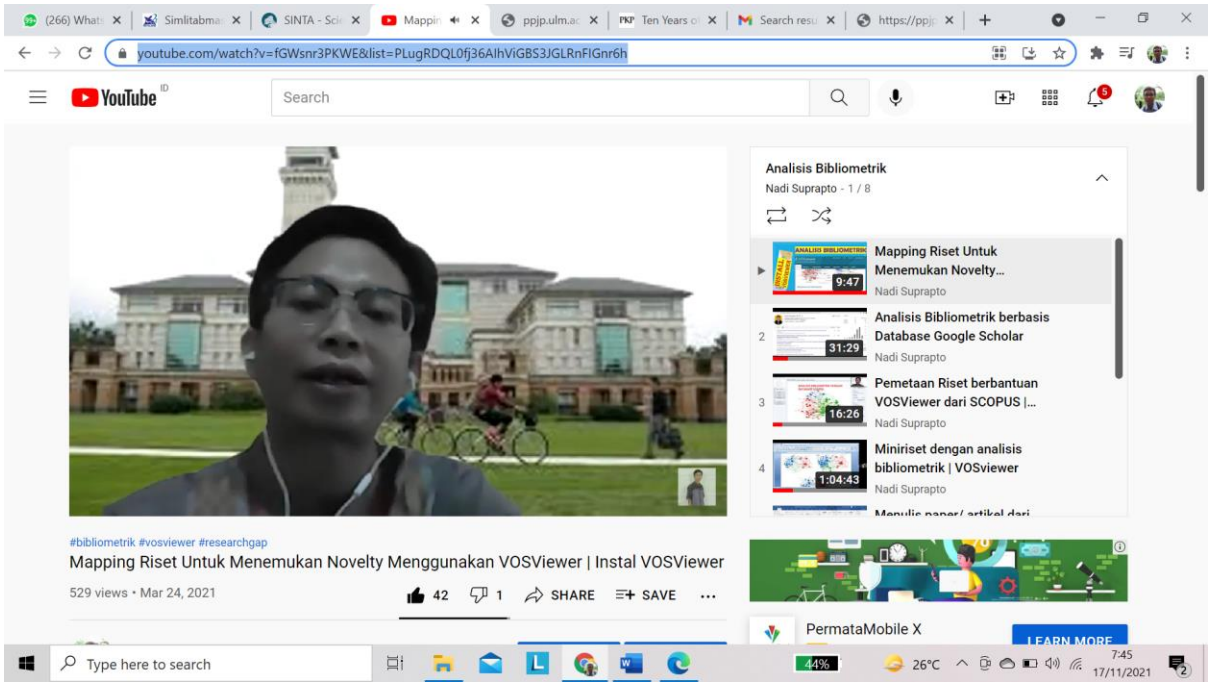

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E. **PERAN MITRA:** Tuliskan realisasi kerjasama dan kontribusi Mitra baik *in-kind* maupun *in-cash* (untuk Penelitian Terapan, Penelitian Pengembangan, PTUPT, PPUPT serta KRUPT). Bukti pendukung realisasi kerjasama dan realisasi kontribusi mitra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

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Sampai saat ini belum ada kendala yang berarti. Namun demikian tim peneliti akan melakukan tindak lanjut atas pencapaian luaran wajib dan tambahan sebagaimana dituliskan pada butir G.

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.

Setelah luaran wajib dan luaran tambahan diperoleh maka langkah selanjutnya adalah sebagai berikut:

1. **Melakukan pengurusan hak cipta atas buku yang sudah diterbitkan**
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Pada tahun 2022, orientasi riset adalah **Pemetaan tren riset peneliti Pend Fisika di Indonesia dibandingkan dengan peneliti global untuk memperoleh cluster peneliti dunia dan peningkatan produktivitas peneliti Pend Fisika**

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.

1. Permendikbud Nomor 92 Tahun 2014: Petunjuk Teknis Pelaksanaan Penilaian Angka Kredit Jabatan Fungsional Dosen.

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Top 100 Cited Publications in Physics Education in The last Thirty Years: A Bibliometric Analysis

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Top 100 Cited Publications in Physics Education in The Last Thirty Years: A Bibliometric Analysis

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Abstract
The present study's focus is to analyze the top 100 cited papers (classic papers) in the field of physics education in the last thirty years. The study is aimed to provide insight into the citation pattern, authorship pattern, year, journals, countries of these classic papers with the help of bibliometric analysis. The data for the study was extracted from the Scopus database. The study indicated that among these top 100 papers maximum were in the form of research articles. The majority of these top-cited papers were published during the five years from 2012 to 2016. The average citation per paper was calculated to be 34 citations per paper. American Journal of Physics, Science and Education, and Physical Review Physics Education Research are the leading publication sources. Meanwhile, Springer Nature and the American Physical Society dominated publishing the most impactful research in physics education. Kuhn is recognized as the most productive author. Whereas McDermott received the greatest number of citations. The institutions whose authors have contributed the most included the University of Washington and California State University. The USA has predominance over the production of highly cited papers followed by Germany and Spain. Maximum works cited in these top 100 papers have been published within the 50 years from 1971 to 2020. The research areas in these papers are mainly emphasized on physics education, physics, students, computer-aided instruction, and medical education.

Keywords: bibliometrics, physics education, top 100 cited, classic paper

Introduction
Research in physics education has overgrown in the past few decades. For example, the American Journal of Physics (AJP) no longer publishes papers on physics education since 2018, but more than 2,000 papers were published over 80 years, which is considered the best data to examine trends in physics education research (Yun, 2020). The second example is Physical Review Physics Education Research (PRPER); the number of papers in this journal has also been steadily growing since its inception. Generally, it is estimated that the production of scientific publications doubles every 15-20 years (Celeste, Broadbent, & Moyses, 2016; Devi, 2021).

Research is conducted on numerous topics by various authors from different institutions, and knowledge is being advanced through research publications in the form of journal articles, conference proceedings and other media of scholarly communication (Siwach & Kumar, 2015; Suprapto, Prahani, & Deta, 2021; Yanuarti & Suprapto, 2021). However, it is not easy to access the most impactful studies and trending research topics in any field (Yeung, Goto, & Leung, 2017). Bibliometric studies are helpful to identify the research trend and the impactful studies (Parmar, Siwach, & Kumar, 2020; Suprapto et al., 2021). Citation analysis in bibliometric studies is considered a scientific metric measure and use to identify the most impactful research in a field (Devi, 2021; Garfield, 1979). It is an essential tool to measure the impact or influence of that research on the other papers published at relatively low cost (Garfield, 1979; Sengupta, Sarode, Sarode, Gadbail, Gondivkar, Patil, & Patil, 2020). Indeed, some other indirect indicators of quality publication like Scimago Journal Rank (SJR), Impact Factor (IF) and h-index, are also based on the citation count (Devi, 2021; Hirsch, 2005). Thus, the papers receiving more citations are expected to have a good quality of research and influence the knowledge domain in a particular field. Moreover, any paper receiving 100 citations can be considered a classic paper (Heldwein, Rhoden, &

Morgentaler, 2010).

This study reviewed the trends of research in physics education in terms of the top 100 cited papers to identify the status of physics education research and help researchers in future studies. The study's main objective is to explore the top 100 cited papers in physics education during the period from 1991 to 2020. The specific objectives of the study are as below:

1. To know the types of publications of the top 100 cited papers in physics education.
2. To study the year-wise distribution of the top 100 cited papers in physics education.
3. To identify the sources publishing of the top 100 cited papers in physics education.
4. To study the authorship pattern and prolific authors of the top 100 cited papers in physics education.
5. To identify the institution producing of the top 100 cited papers in physics education.
6. To know the country of origin of the papers and collaboration among them.
7. To study the period of references of the top 100 cited papers in physics education.

Methods

For obtaining the data for the present study, Scopus database was used. The database was searched for the subject category "physics education" using the string given below:

> *"TITLE (physics AND education) AND (LIMIT-TO (PUBYEAR, 2020) OR LIMIT-TO (PUBYEAR, 2019) OR LIMIT-TO (PUBYEAR, 2018) OR LIMIT-TO (PUBYEAR, 2017) OR LIMIT-TO (PUBYEAR, 2016) OR LIMIT-TO (PUBYEAR, 2015) OR LIMIT-TO (PUBYEAR, 2014) OR LIMIT-TO (PUBYEAR, 2013) OR LIMIT-TO (PUBYEAR, 2012) OR LIMIT-TO (PUBYEAR, 2011) OR LIMIT-TO (PUBYEAR, 2010) OR LIMIT-TO (PUBYEAR, 2009) OR LIMIT-TO (PUBYEAR, 2008) OR LIMIT-TO (PUBYEAR, 2007) OR LIMIT-TO (PUBYEAR, 2006) OR LIMIT-TO (PUBYEAR, 2005) OR LIMIT-TO (PUBYEAR, 2004) OR LIMIT-TO (PUBYEAR, 2003) OR LIMIT-TO (PUBYEAR, 2002) OR LIMIT-TO (PUBYEAR, 2001) OR LIMIT-TO (PUBYEAR, 2000) OR LIMIT-TO (PUBYEAR, 1999) OR LIMIT-TO (PUBYEAR, 1998) OR LIMIT-TO (PUBYEAR, 1997) OR LIMIT-TO (PUBYEAR, 1996) OR LIMIT-TO (PUBYEAR, 1995) OR LIMIT-TO (PUBYEAR, 1994) OR LIMIT-TO (PUBYEAR, 1993) OR LIMIT-TO (PUBYEAR, 1992) OR LIMIT-TO (PUBYEAR, 1991))"*

The data were collected on June 19, 2021. The obtained results were then sorted according to 'times cited' from highest cited to lowest cited. Then the data for the top 100 cited papers was extracted from the database. The data was analyzed with the help of MS-Excel and using the *VOSviewer* software and word cloud generator for visualization (Suprapto et al., 2021a; 2021b; 2021c; van Eck & Waltman, 2020).

Results and Discussion

Publication Type

Table 1. Document types of top cited papers

Document Type	Frequency	Total Citation	Mean	Median	S.D.
Article	77	2763	35.88	22	49.97
Conference paper	11	268	24.36	20	13.32
Review	7	310	44.29	31	42.67
Book Chapter	2	33	16.50	16.5	0.71
Editorial	1	22	22.00	22	-
Short survey	1	13	13.00	13	-
Note	1	13	13.00	13	-
Total	**100**	**3422**	**34.22**	**-**	**-**

The document types of top 100 publications that have been published in physics education from 1991 to 2020 are shown in Table 1. Among these 100 papers, 77 were in the form of articles, 11 were conference papers, and 7 were review papers. The average citation per document in each category was diverse, with an average is 34. However, the standard deviation for research articles and review papers was high, 49.97 and 42.67, respectively. Meanwhile, the mean citation count of the review was the highest (44.29). In contrast, short surveys and notes were the minor mean citation.

Year-wise distribution of top 100 papers

The top 100 cited articles of physics education have been published during the date range from 1991 to 2019. Maximum among these have been published in the year 2015 (9 articles), followed by the years 2014 (8 articles), 2001, 2013, 2016, and 2019 (7 articles each).

Table 2. Year-wise distribution of papers

Year	Articles	Citations	ACPP	ACPPY	Citable years
1991	1	57	57	1.90	30
1993	2	41	20	0.73	28
1994	2	40	20	0.74	27
1995	1	23	23	0.88	26
1997	1	78	78	3.25	24
1998	3	73	24	1.06	23
1999	1	377*	377*	17.14*	22
2000	3	171	57	2.71	21
2001	7	376	54	2.69	20
2002	3	97	32	1.70	19
2003	2	32	16	0.89	18
2004	2	41	20	1.21	17
2005	5	209	42	2.61	16
2006	6	165	28	1.83	15
2007	4	176	44	3.14	14
2008	3	71	24	1.82	13
2009	1	23	23	1.92	12
2010	3	91	30	2.76	11
2011	2	50	25	2.50	10
2012	5	193	39	4.29	9
2013	7	128	18	2.29	8
2014	8	351	44	6.27	7
2015	9*	155	17	2.87	6
2016	7	149	21	4.26	5
2017	3	67	22	5.58	4
2018	2	55	28	9.17	3
2019	7	133	19	9.50	2
Total	**100**	**3422**	**34**	-	-

*ACPP= Average Citation Per Paper, ACPPY= Average Citation Per Paper Per Year, *=the highest number*

These top 100 articles received a total of 3422 citations, with an average of 34 citations. The average citation per paper was highest (377) for 1999, while the average citation per paper per year was maximum (17.14) in the same year.

Sources of Publication

Table 3 shows the list of sources that have published the top 100 cited papers in physics education. These top 100 papers have been published in 58 different sources either journals or conference proceedings. The journals "American Journal of Physics" and "Science and Education" are the leading sources publishing seven papers. Meanwhile, six papers were published in "Physical Review Physics Education Research" while five papers were published in "Physical Review Special Topics - Physics Education Research", as the former name of this journal. The top cited papers were also appeared in JSET, IJSE, Physics Teachers, Physics Education, and *Physica Med*ica journal. As regards the publishers of these 58 sources, 13 are published by Springer Nature, 11 by the American Physical Society, seven by the American Association of Physics Teachers, and six by Taylor & Francis. The remained publishers are American Institute of Physics (AIP), Institute of Physics (IOP), and Wiley-Blackwell.

Table 3. Sources of top cited papers

Sources	Publisher	Articles	Citations	ACPP
American Journal of Physics (AJP)	American Association of Physics Teachers	7	742	106
Science and Education (S & E)	Springer Nature	7	283	40
Physical Review Physics Education Research (PRPER)	American Physical Society	6	119	20
Physical Review Special Topics - Physics Education Research (PR-PER)	American Physical Society	5	270	54
Journal of Science Education and Technology (JSET)	Springer Nature	4	101	25
International Journal of Science Education (IJSE)	Taylor & Francis	4	128	32
Physics Teacher	American Institute of Physics	4	108	27
Physics Education (PE)	Institute of Physics Publishing	4	104	26
Physica Medica (PM)	*Istituti Editoriali e Poligrafici Internazionali*	4	58	14
Science Education (SE)	Wiley-Blackwell	3	175	58
International Journal of Science and Mathematics Education (IJSME)	Springer Nature	2	67	34
Physics Today	American Institute of Physics	2	150	75
Journal of Science Teacher Education (JSTE)	Taylor & Francis	2	28	14
IEEE Antennas and Propagation Magazine	IEEE	2	31	16
Other sources (with one paper each)	-	44	1058	24
Total	**-**	**100**	**3422**	34

The paper published in “Physica Medica” has exponential growth; all the papers published in the source are from 2012 to 2020. In the case of “Physics Education” by IOP has exponential growth, all the papers published in the source are from 2015 to 2020. Meanwhile, for papers published in other journals, the number tends to be constant; some even fluctuate, such as Physics Today and Physics Medica (1991-2002).

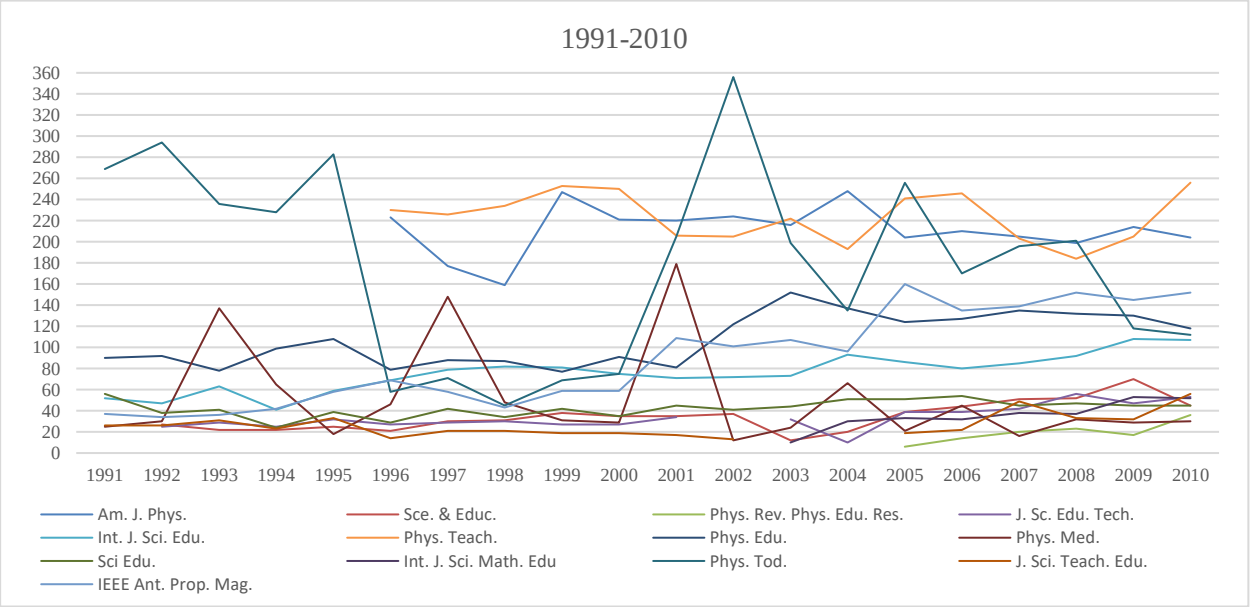

Figure 1. Source growth (1991-2010)

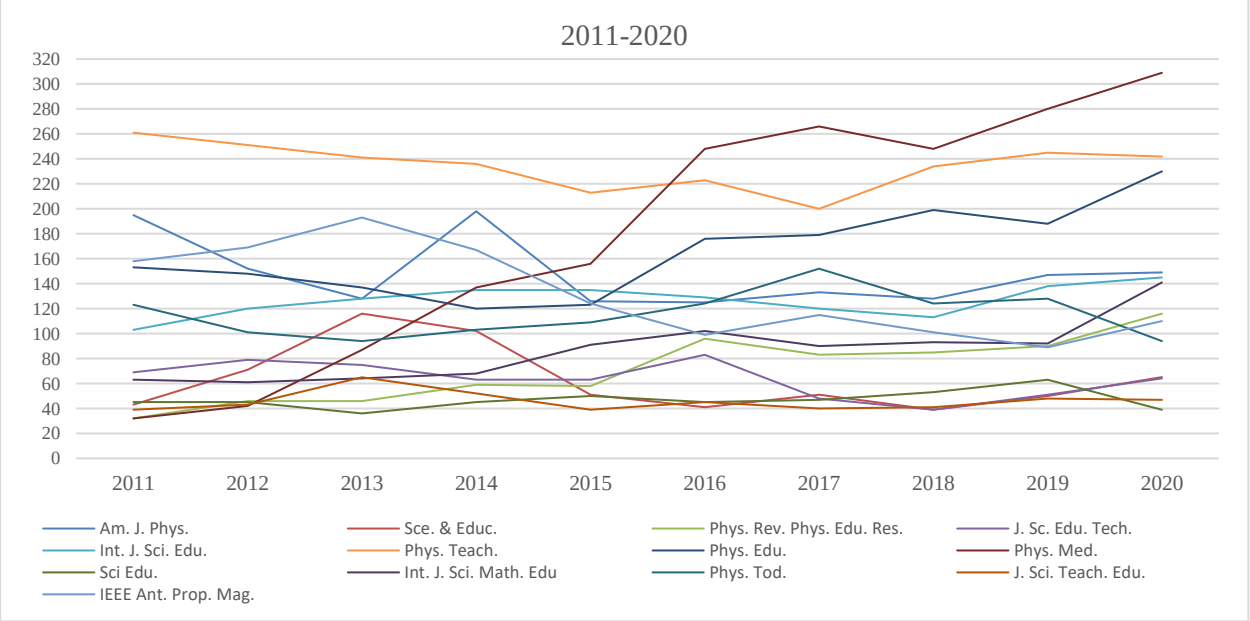

Figure 2. Source growth (2011-2020)

Authors of top 100 papers

Total 227 authors were associated with these 100 top-cited papers in education. Table 4 lists the most prolific authors along with their papers and citations. Nineteen such authors have published more than one top-cited paper, and these authors have contributed to 19 articles as the first author. Kuhn J is recognized as the most productive author, publishing five papers. At the same time, McDermott LC received the most significant number of citations (604) and the most remarkable link strength (11). Top authors' clusters and author production over time are illustrated in Figure 3. Accordingly, there were two major clusters of authors in classic paper in physics education, namely McDermott cluster and Maestre cluster.

Table 4. Author profiles

Authors	Total Articles	Total Citations	Total link strength
McDermott LC	3	604*	11*
Redish EF	2	393	10
Mestre JP	2	213	7
Heron PRL	2	48	5
Caballero RD	2	43	4
Eudaldo T	2	33	4
Olsen K	2	33	4
Kuhn J	5*	123	3
Meltzer DE	2	46	3
Vogt P	2	47	3
Caruana CJ	3	42	2
Christofides S	2	25	2
Koponen IT	4	179	2
Nissen J	2	24	1
Van Dusen B	2	24	1
Mujtaba T	2	68	0
Reiss MJ	2	68	0
Sevgi L	2	31	0
Vollmer M	2	97	0
Other authors with 1 paper each	208		

Based on the single article, the following are the top three of articles that got most citations:

1. Resource Letter: PER-1: Physics Education Research by McDermott and Redish (1999) in American Journal of Physics (377 citations).
2. Oersted medal lecture 2001: "Physics education research - The key to student learning" by McDermott (2001) in American Journal of Physics (201 citations).
3. Synthesis of discipline-based education research in physics by Docktor and Maestre (2014) in Physical Review Special Topics - Physics Education Research (168 citations).

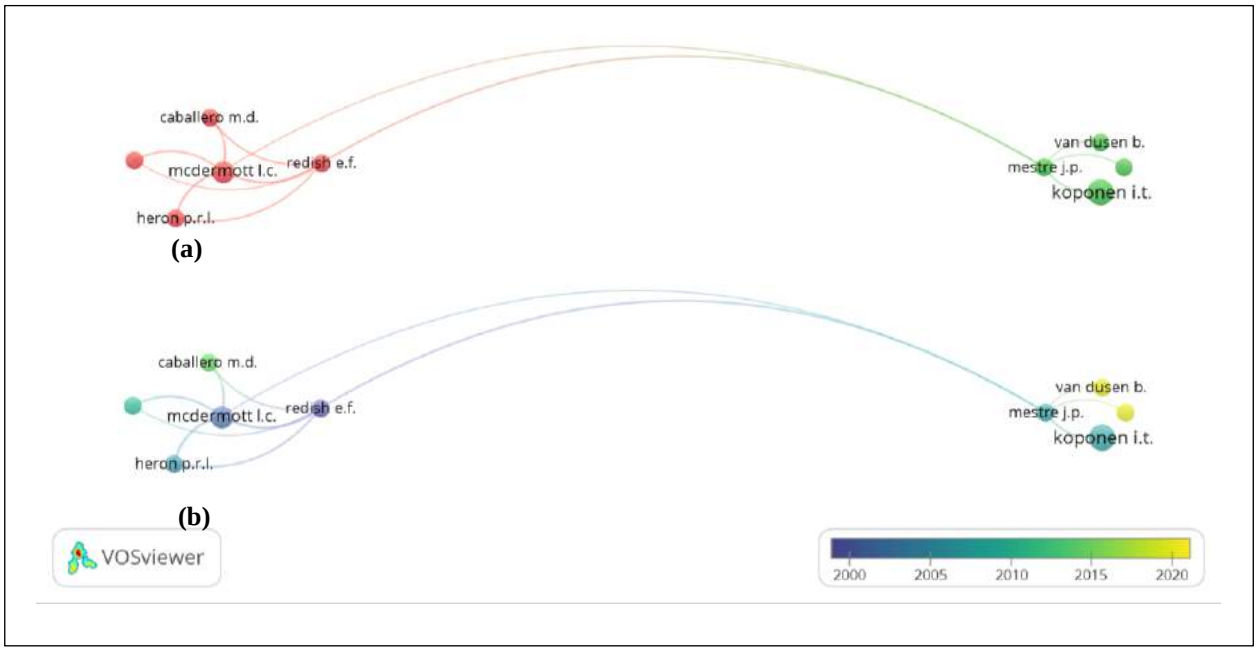

Figure 3. (a) Top authors' cluster; (b) Author production over time

Most Relevant Affiliations and Countries

The top-cited papers in the present study are affiliated with 181 institutions from 33 different countries. Figure 3 shows the most relevant affiliation. The University of Washington with 227 citations, California State University with 24 citations, Hospital *de la Santa Creu I Sant Pau*, Spain with 33 citations, has two papers each.

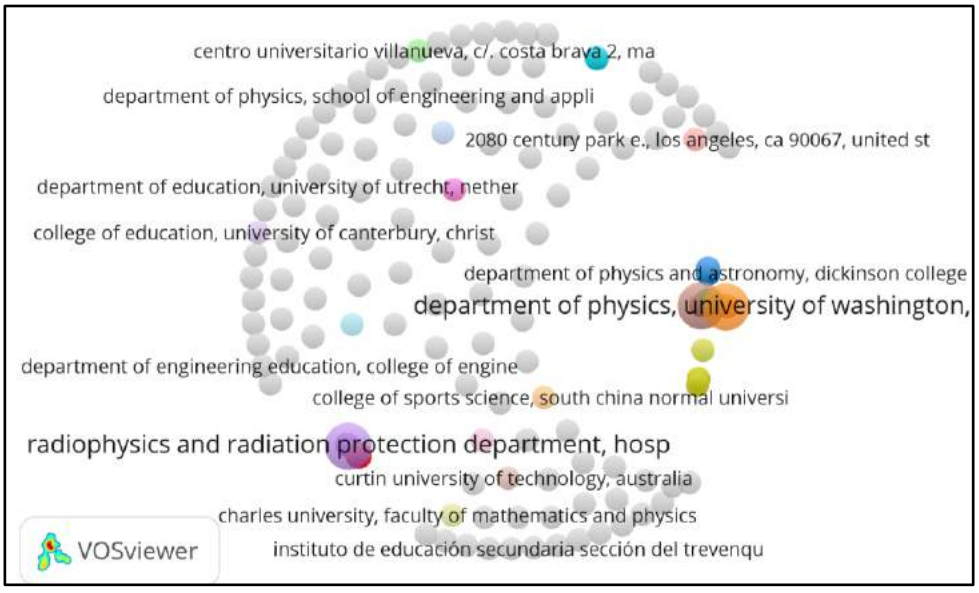

Figure 4. Most relevant affiliations

Table 5. Country of Publication

Country	Articles	Total Citations	Average Article Citations	Total link strength
USA	37	1725	46.62	10
Germany	13	438	33.69	4
Spain	8	149	18.62	6
Finland	7	263	37.57	2
UK	6	163	27.17	1
Indonesia	6	112	18.67	1
Netherlands	5	140	28.00	0
Turkey	4	77	19.25	0
Denmark	4	55	13.75	7
Australia	3	65	21.67	0
Malta	3	42	14.00	2
Canada	2	60	30.00	0
Italy	2	59	29.50	3
China	2	49	24.50	0
Sweden	2	36	18.00	4
Israel	2	36	18.00	1
Cyprus	2	25	12.50	3
Austria	2	24	12.00	0

For calculating the country of publications, only the first author was considered. Table 5 indicates that 18 different countries have produced the top 100 papers. USA has predominance over the production of highly cited papers with 37 papers, followed by Germany (13 papers), Spain (8 papers), Finland (7 papers), and the UK and Indonesia (6 papers each). The illustration of the most relevant countries is illustrated in Figure 5.

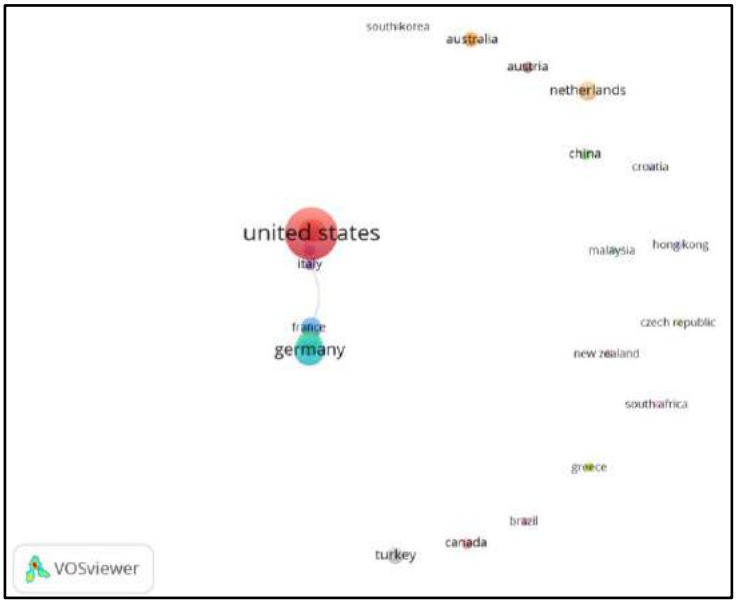

Figure 5. Most relevant countries

Table 6. References time span of top papers

Year of References	No. of References	% Age
1891-1900	13	0.29
1901-1910	17	0.38
1911-1920	20	0.45
1921-1930	11	0.25
1931-1940	10	0.23
1941-1950	16	0.36
1951-1960	26	0.59
1961-1965	27	0.61
1966-1970	27	0.61
1971-1975	47	1.06
1976-1980	89	2.01
1981-1985	187	4.23
1986-1990	327	7.39
1991-1995	491	11.10
1996-2000	733	16.58
2001-2005	691	15.63
2006-2010	846	19.13
2011-2015	674	15.24
2016-2020	170	3.84
Total	**4422**	**100.00**

Among all the countries producing highly cited papers, the articles from the USA have received the highest number of citations (1725), with an average citation per paper of 46.62. Meanwhile, Finland performed an average citation of paper of 37.57. The average citation received by each county is around 10 to 50 citations per document.

References

Table 6 illustrates the time of the references of the top-cited papers. The references used in these papers range from 1891 to 2020. Out of the total references, 96% falls within the time range from 1971 to 2020 or 44% within the time range from 1991 to 2015. The maximum numbers of references (19.13%) belong to 2006-2010. It was observed these papers were produced from 2011 to 2020, and the reference used in this literature is mostly newly emerged within the recent 20 years. The old pieces of literature have also been cited, but that amounts to tiny per cent of the total references. The visualization of the most relevant references is illustrated in Figure 6. Meanwhile, Figure 7 indicates the cited references cluster produced among references time of top papers.

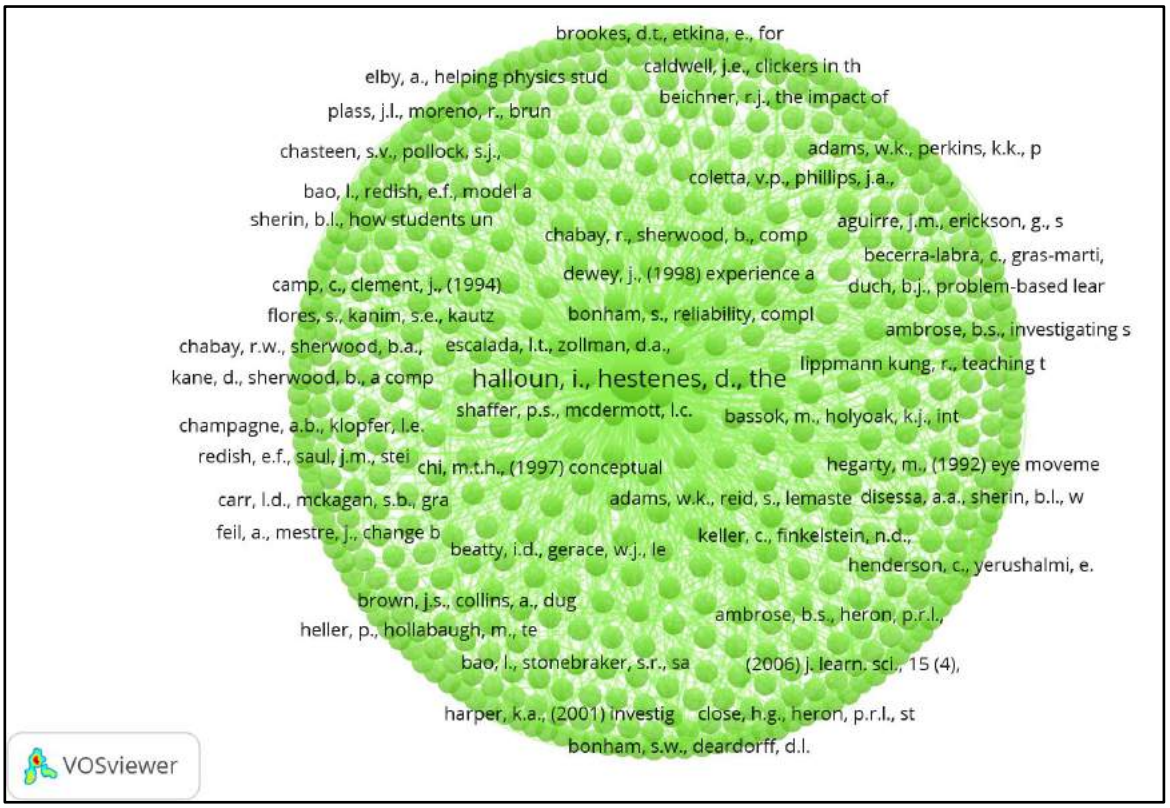

Figure 6. Most relevant references

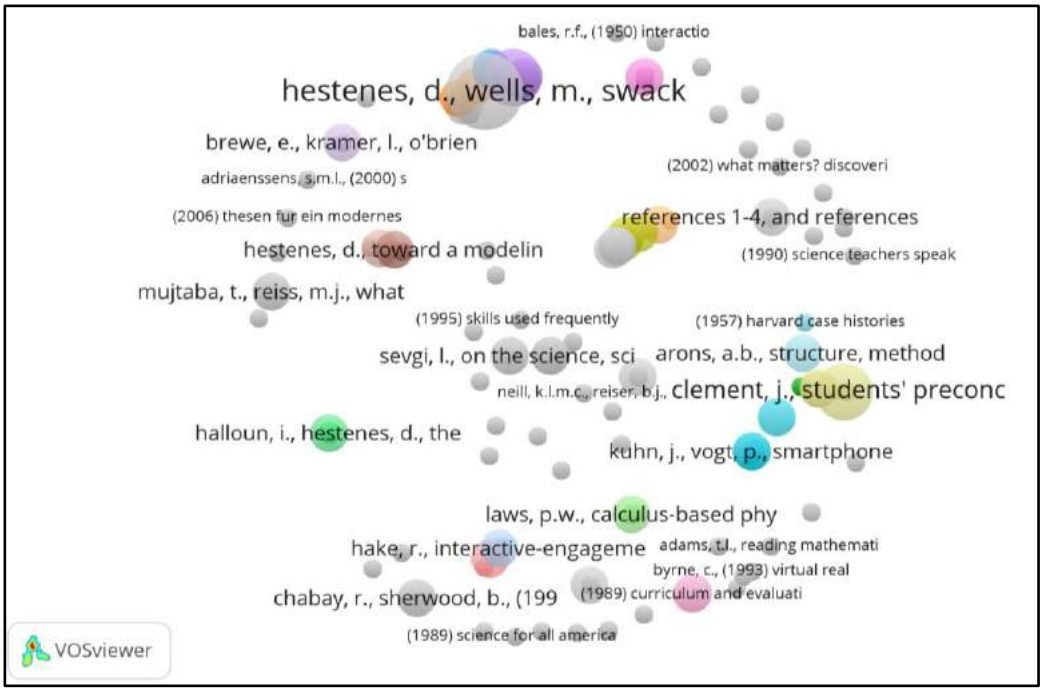

Figure 7. Cited references cluster

Keywords of the papers

The most frequently used keywords are indicated graphically in figure 8. The font size of the

text in the figure represents the frequency of the words used in these papers. The words used more frequently are physics, students, education, physics education, article, medical education, human, curriculum, Europe, and computer-aided instruction.

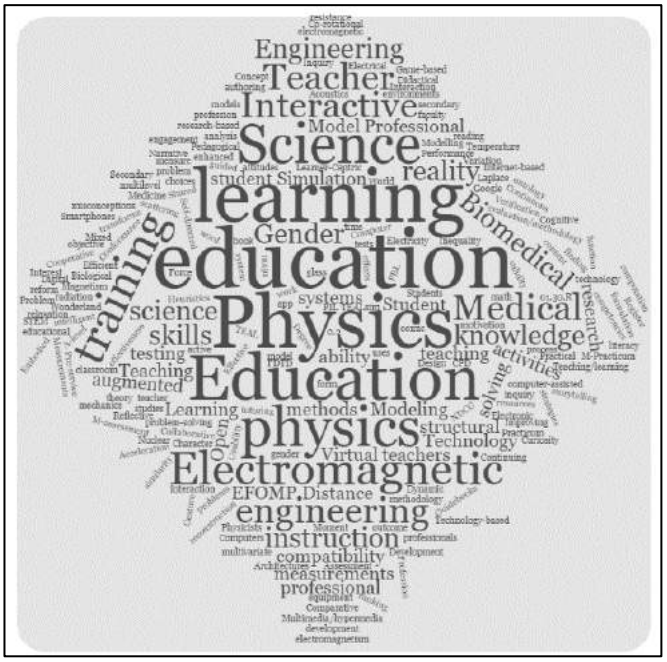

Figure 8. Most relevant keywords

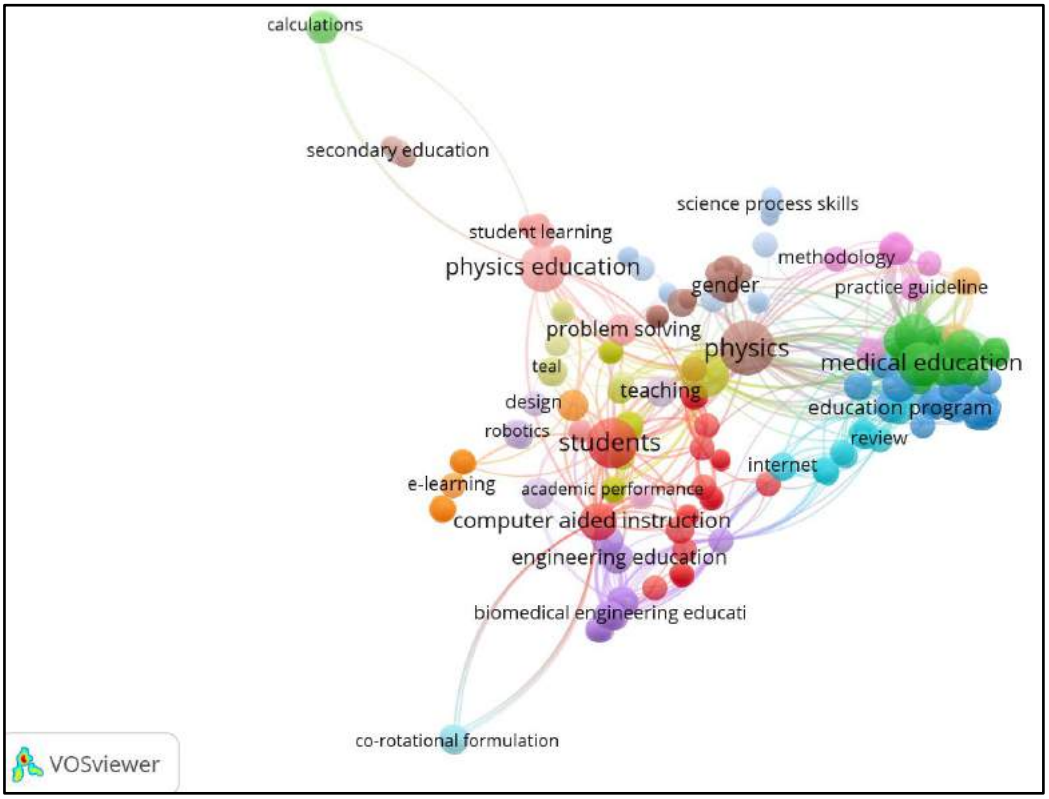

Figure 9. Keyword co-occurrence

Keyword co-occurrence

The keyword co-occurrence network in Figure 9 is based on the most frequently occurred keyword-plus words with a minimum of 5-edge points. Twenty-five such keywords are identified. This keyword co-occurrence network provides a brief insight into the areas/topics on which the research has been conducted. The map identified ten such clusters with some common words among these clusters: physics, students, physics education, teaching, medical education, problem-solving, engineering education, etc. The size of the text represents the more frequently used words. The primary cluster among all these clusters has five keywords; the clusters suggest that many researchers have conducted on "physics education", "physics", "students", "computer-aided instruction", "medical education". Some other clusters mainly focus on science process skills, gender, problem-solving, e-learning, etc.

Conclusion

This paper is the first of its kind bibliometric study of 100 top-cited papers in the "physics education" field. The study data consisted of top 100 publications in physics education from 1991 to 2020 obtained from the Scopus database. It was found that among these top 100 papers maximum were in the form of research articles, followed by conference papers, and a few were review papers. The majority of these top-cited papers were published during the five years from 2012 to 2016. The average citation per paper was calculated to be 34 citations per paper. The journals "American Journal of Physics", "Science and Education", and "Physical Review Physics Education Research" are the leading sources of publication and Springer Nature, American Physical Society, American Association of Physics Teachers, and Taylor & Francis has dominance in publishing most impactful research in physics education. The majority of the research papers were multi-authored. Kuhn J is recognized as the most productive author. At the same time, McDermott LC received the most significant number of citations and the most incredible link strength. The institutions whose authors have contributed the most included the University of Washington, California State University, and Hospital *de la Santa Creu I Sant Pau*, Spain. The USA has predominance over the production of highly cited papers followed by Germany and Spain. Maximum works cited in these top 100 papers have been published within the 50 years from 1971 to 2020. The research areas in these papers are mainly emphasized on physics education, physics, students, computer-aided instruction, and medical education.

Acknowledgements

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6-2021

Research Trend on Ethnoscience through Bibliometric Analysis (2011-2020) and The Contribution of Indonesia

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Research Trend on Ethnoscience through Bibliometric Analysis (2011-2020) and The Contribution of Indonesia

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Abstract: This paper aims to analyze the scientific trend of research on ethnoscience through bibliometric study and to explore how the contribution of Indonesian researchers in the Scopus database from 2011 to 2020. The sample was composed of 536 documents in total. The results revealed that scientific publication on ethnoscience has been increasing. The USA contributed the most documents on ethnoscience as well as Indonesia's institutions dominated in this area. Indeed, Indonesia put its two representative's institutions: Universitas Negeri Semarang and Universitas Negeri Yogyakarta, among the big ten institutions in the world. All Indonesian documents produced by teacher-producing universities and public universities. The USA and Indonesia have also contributed to the most productive authors of ethnoscience. Then, the visualization of research trend on ethnoscience resulted in three primary clusters: (1) ethnoscience management in the world, (2) ethnoscience in relating to academic domain, anthropology, history, and other social sciences, (3) ethnoscience in connecting with data collecting process, and one secondary cluster: ethnoscience in relating to its effect, lack, and benefit to society as a participant. The research findings could aid related researchers to recognize the trend of ethnoscience research globally and recommend directions for further research.

Keywords: *ethnoscience, bibliometric study, research trend, Scopus, Indonesia*

1. Introduction

The word ethnoscience comes from the word *ethnos* (Greek), which means nation, and *Scientia* (Latin) means knowledge (George, 1991; Moriolkosu, Handayani, & Sunarso, 2020; Suprapto, Prahani, & Cheng, 2021). Therefore, ethnoscience is the knowledge possessed by a cultural community. Its emphasis on indigenous and distinctive knowledge of a cultural community (Suprapto, Prahani, & Cheng, 2021). In other words, ethnoscience is a branch of cultural studies that seek to understand how natives understand their nature. Indigenous people usually have an ideology and philosophy of life that influence them to survive. On this basis, it can be stated that an ethnoscience is a new form of ethnography. Through ethnoscience, cultural researchers will build grass-root theories and do not have to adopt western cultural theories that are not necessarily relevant. Ethnoscience research on cultural phenomena is always based on *ethno* and folk. The presence of ethnoscience will indeed give fresh air to cultural research (Spradley, 2001). Although this is not a new thing, because previously they have known *verstehen* (understanding), it still gives a new face to cultural research. Because, indeed, many cultural researchers have systematically made use of ethnoscience studies. Indeed, there is no common opinion regarding the term ethnoscience among researchers. Some call cognitive anthropology, ethnographic semantics, and descriptive semantics (Spradley, 2001). These various terms arise because each expert gives different emphases, but the essence is to seek a scientific level of cultural studies.

Every society experiences growth and development due to needs that change from time to time. In this development, various problem-solving processes occur for a better and more prosperous life through technology. The development of science and technology cannot be separated from positive and negative impacts. On the one hand, the application of science and technology has given birth to various innovations to improve the welfare of human life. However, on the other hand, the application of science and technology has also exploited natural resources to pursue production without considering long-term survival, such as what happened to the impact of the destruction of the natural environment, which resulted in various natural disasters such as

prolonged drought, floods, forest fires, air pollution, all of which only produce misery for the people at large.

The environment, both physical and socio-cultural, can make a specific contribution to students' learning experiences. These experiences can be in the form of thought patterns (cognitive domains), attitudes (affective domains), and behavioral patterns (psychomotor domains). Scientific concepts developed at school did not run smoothly because they were strongly influenced by social factors, especially intuitive knowledge about the world environment (life-word). This knowledge is built up during childhood and is socialized and encultured by others (such as parents and peers). Ogawa stated that one of the intuitive sciences is social or cultural science, or it is also called indigenous science (Ogawa, 1999; Suprapto, Prahani, & Cheng, 2021). Furthermore, other researchers signaled that original science is related to scientific knowledge acquired through oral culture in a long occupied place (Snively & Corsiglia, 2001).

Ethnoscience learning is very relevant to the foundation of the 2013 curriculum development philosophy. The 2013 curriculum was developed using a philosophy, namely, 1) education is rooted in national culture to build the life of the present and future nation. 2) Students are creative heirs of the nation's culture. 3) Education is aimed at developing intellectual and intelligence academic brilliance through education in scientific disciplines. 4) Education to build a better present and future life than the past with various intellectual abilities, communication skills, social attitudes, care, and participation to build a better life for the community and nation. The success of the learning process at school is strongly influenced by the cultural background of the students or the community where the school is located.

Research on ethnoscience have been conducted by many authors around the world, for example in USA (Davison & Miller, 1998), Brazil (Sotero, Alves, Arandas, & Medeiros, 2020), Germany-Indonesia (Zidny & Eilks, 2020), Indonesia (Sudarmin, Zahro, Pujiastuti, Asyhar, Zaenuri, & Rosita, 2019; Wati, Yuberti, Saregar, Fasa, & Aziz, 2021). However, there is a few studies that focused on research trend of ethnoscience and the use of bibliometric analysis.

Research trend on ethnoscience

Despite the importance of ethnoscience, there have been few attempts to gather data about the worldwide scientific production of ethnoscience. Bibliometric analysis provided a precise method to evaluate the contribution of a paper to the advancement of knowledge (Chen & Ho, 2015; Yang, Sun, & Liu, 2017). Bibliometric indicators, including research fields, document sources, publication outputs, document sources, language sources, distribution of countries and institutions, top authors, number of citations, and author keywords, have been frequently used to analyze the trends (Chen & Ho, 2015; Dong, Xu, Luo, Cai, & Gao, 2012; Yang et al., 2017). The purpose of this study is to analyze the trends of ethnoscience research in the last ten years (2011-2020) in order to help educational researchers, comprehend the landscape of global ethnoscience.

Research Questions

This study focused on the research trend on ethnoscience on interval 2011-2020 with six research questions:

a) To what extent did the profile of publication output of ethnoscience in 2011-2020?
b) To what extent did the distribution of publication of ethnoscience across countries and institutes in the world?
c) Who were the top authors in researching of ethnoscience in the world?
d) How did the publication patterns of ethnoscience in 2011-2020?
e) How did the visualization results of the research trend of ethnoscience?
f) To what extent did the contribution of Indonesian authors on researching ethnoscience in 2011-2020?

2. Research Method

The study followed the guidance of bibliometric study (Dong et al., 2012; Kulakli & Osmanaj, 2020; Yang et al., 2017). The first author has also experienced in conducting a bibliometric analysis (Suprapto, Sukarmin, Puspitawati, …, & Mubarok, 2021). The researchers utilized Scopus database, since this source includes the journals and conference proceedings that are considered more relevant by the scientific communities, as well as for their constancy and periodicity. The research was initiated by performing an online searching during 22-28 April 2021. The complete steps were illustrated on Figure 1. The researchers performed an online searching by inputting "ethnoscience" on the title, key words, and abstract (field of discipline) from 2011 to 2020.

Figure 1. Five steps in conducting bibliometric analysis
(Masitoh et al., 2021; Schmeisser, 2013; Setyaningsih, 2018)

It was 536 documents fulfilled the searching criteria of 1147 documents of whole years (see Figure 2). The data were documented in the form of the (*.ris*) and (*.csv*). Subsequently, these records were processed in different programs for bibliometric and network analysis: Microsoft Excel and *VOSviewer*. *VoSViewer* software was used to figure out the research trend on ethnoscience (van Eck & Waltman, 2020). The investigation was conducted to analyze the research trends that including characteristics of publication out-puts, document sources, language sources, distribution of countries and institutions, distribution of outputs in subject categories, top authors, top citations, and publication trends from 2011 to 2020. The co-occurrence of keywords was carried out with *VOSviewer*, which uses a Visualization of Similarities algorithm (VOS) as an alternative to multidimensional scaling (Putri et al., 2021).

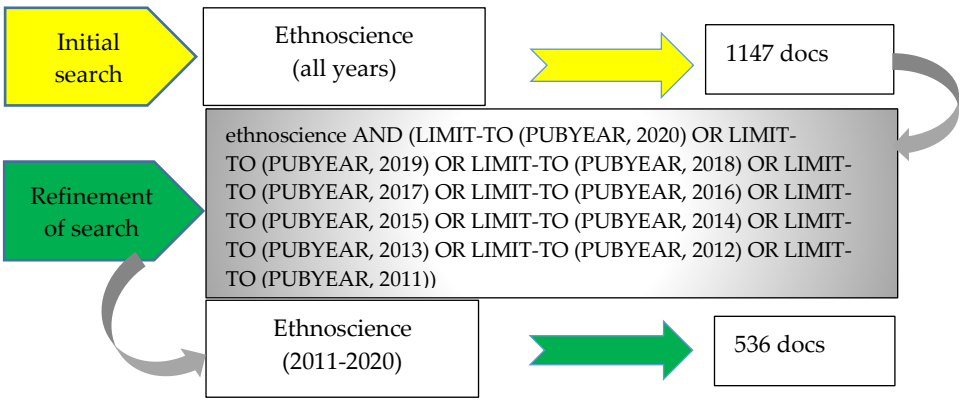


Figure 2. Illustration of initial and refinement search

3. Results

Publication Output, Document Sources, and Language Sources

There were 536 papers associated with ethnoscience research in the Scopus database, including 5 document sources (journal, book, conference proceeding, book series, and trade journal). The publications devoted to ethnoscience research throughout 2011 to 2020 are demonstrated in Figure 3 and Figure 4. The number of documents of ethnoscience across the year was increased significantly. It was less than 30 documents before 2010 and more than 30 documents of each year in 2011-2020. Even though, it was fluctuated in duration 2013-2018,

however the trend was increased in 5 decades. The term ethnoscience first appear in 1967 in American Behavioral Scientist, by Werner (1967). It can be predicted that the number of articles in 2021-2025 will increase dramatically.

Meanwhile, the number of articles based on sources indicated the dominance of articles in the journal (324 documents). It was followed by a book (164) and conference proceeding (39). The book series and trade journal accounted for the fewest sources of documents.

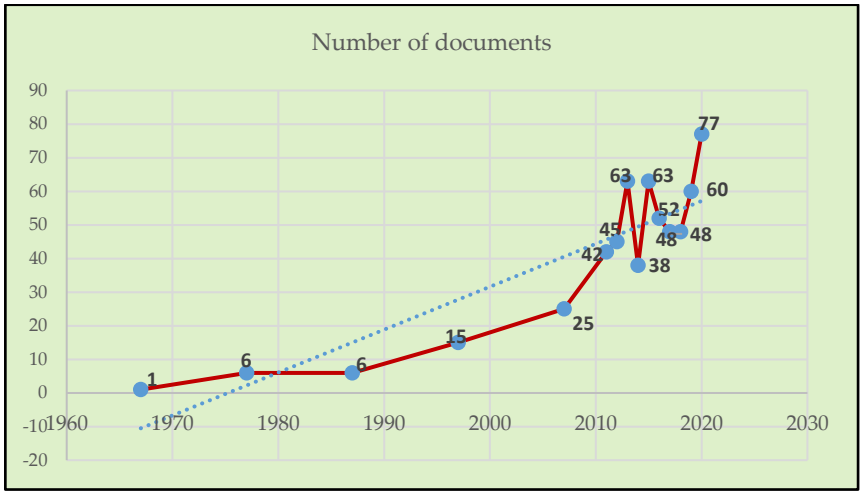


Figure 3. The number of documents on ethnoscience from the beginning (1967) and the last ten years (2011-2020)

Furthermore, out of a total of 536 documents, most articles used English as the language of articles (497 documents or 92%). The rest documents were using French (3%) and Portuguese (1.5%). While it was in a small number, the documents used Spanish, Italian, Polish, Chinese, Russian, German, Indonesian, and Norwegian with a percentage less than 1% (see Figure 5).

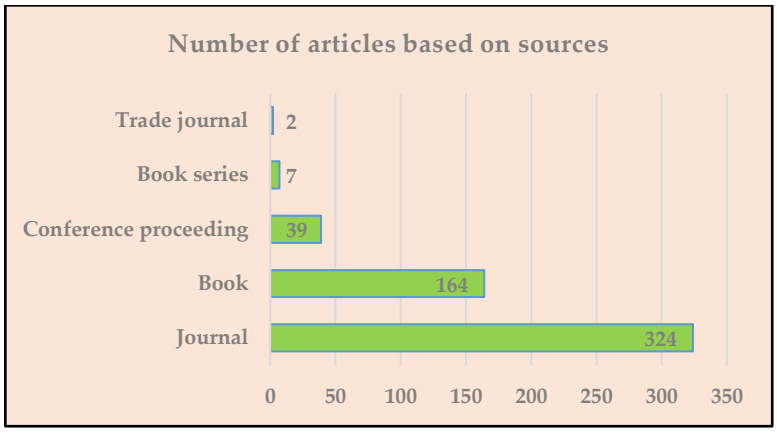


Figure 4. The number of articles of ethnoscience based on source categories

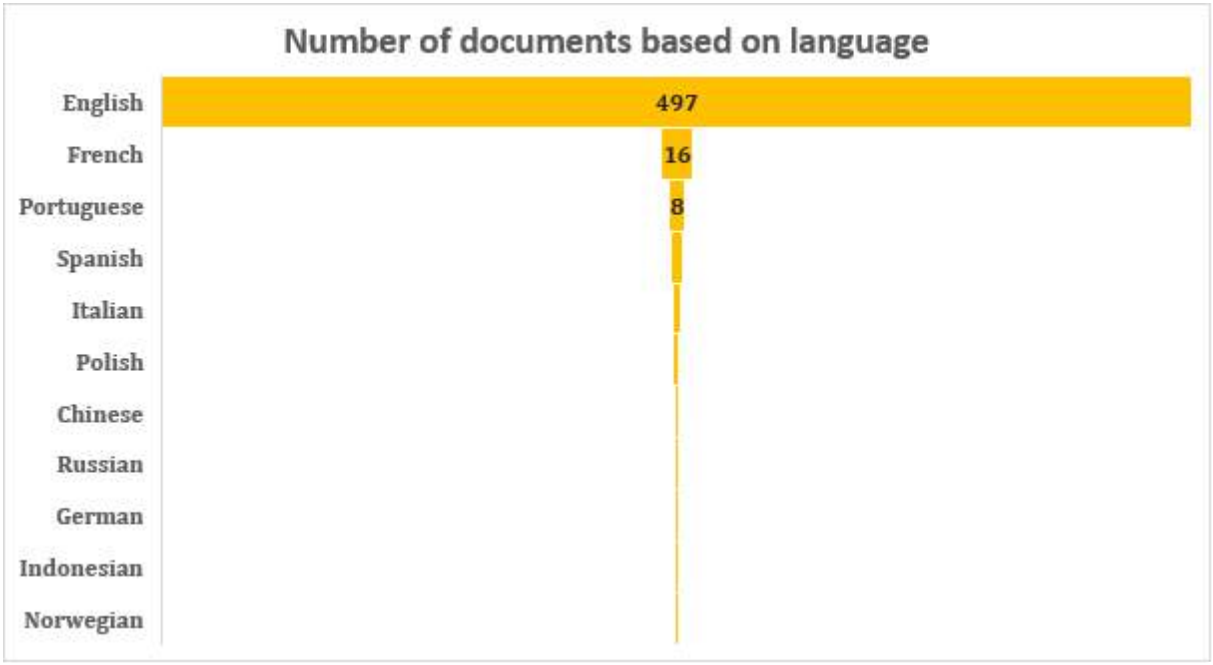
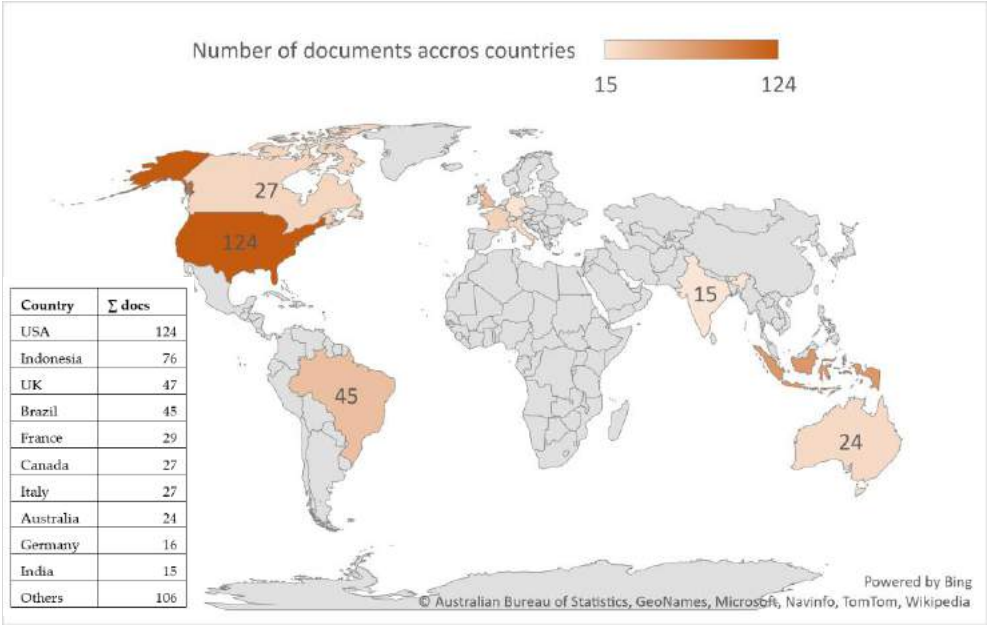


Figure 5. The percentages of articles on ethnoscience based on language during 2011-2020

Publication Distribution of Countries and Institutes

Based on the number of documents across countries, it was clear the dominance of the USA with 124 documents from 2011 to 2020. The countries such as Indonesia, UK, and Brazil contributed to this topic with 76, 47, and 45 documents, respectively. Meanwhile, with almost the same number, France, Canada, Italy, and Australia contributed documents between 20-30. The rest of the ten countries that contributed the most to research on ethnoscience were Germany and India.



Country	∑ docs
USA	124
Indonesia	76
UK	47
Brazil	45
France	29
Canada	27
Italy	27
Australia	24
Germany	16
India	15
Others	106

Figure 6. Number of documents based on countries 2011-2020

The number of documents of ethnoscience (2011-2020) across the institution could be seen in Table 1. Indonesia places its two institutions in the first and sixth rank. Universitas Negeri Semarang (UNNES), Indonesia has ranked first with 20 documents and was followed by the

Università Cattolica del Sacro Cuore, Italy. Meanwhile, other institutions were dominated by Brazil and the USA.

Table 1. Number of documents of ethnoscience (2011-2020) across institution

No	Institution	Number of Documents
1	*Universitas Negeri Semarang*, Indonesia	20
2	*Università Cattolica del Sacro Cuore*, Italy	14
3	*Universidade de Sao Paulo* – USP, Brazil	11
4	University of Alberta, Canada	11
5	*CNRS Centre National de la Recherche Scientifique*, France	9
6	*Universitas Negeri Yogyakarta*, Indonesia	8
7	*Universitatea Alexandru Ioan Cuza*, Romania	7
8	Indiana University Bloomington, USA	7
9	*Universidade Federal Rural de Pernambuco*, Brazil	6
10	University of California, Riverside, USA	6

Top Authors in Researching of ethnoscience

In terms of most productive authors, Figure 6 indicates the top ten authors in researching on ethnoscience. Sudarmin, Graffigna, Sandu, Sumarni, Olson, Barello, Chirazi, Mannion, Murrieta, Prado, Shapiro and Wiyanto were the most productive authors in this topic. Generally, the performance of authors in line with the top citation of the article all years, as indicated in Table 2 For example, Ingold (1718). Meanwhile, Table 3 depicts the top citation of articles in the duration of 2011-2020. It was listed that Ingold (2011), Atran (2011), Wilson & Sperber (2012), van Dijk (2014), Sinkovics & Alfoldi (2012) resulted in their articles as the top 5 citations in 2011-2020.

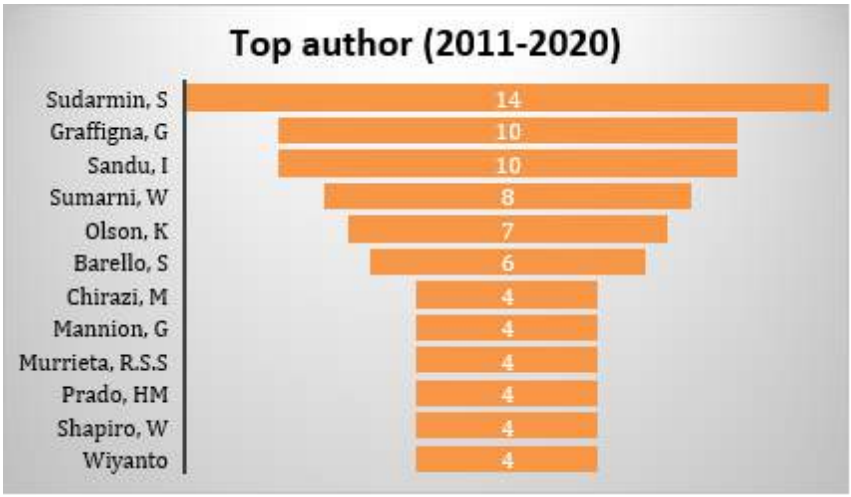


Figure 7. Top authors in researching of ethnoscience during 2011-2020

Table 2. Top citation of article of all years

Author (s)	Journal	∑ citations
Ingold (2011)	Being Alive: Essays on Movement, Knowledge and Description pp. 1-270, Book	1718
Agrawal (1995)	Development and Change, 26(3), pp. 413-439	1070
Lee (1989)	MIS Quarterly: Management Information Systems, 13(1), 33-50	765
Atran (2011)	In Gods We Trust: The Evolutionary Landscape of Religion, In Gods We Trust: The Evolutionary Landscape of Religion, pp. 1-364	665
Wezel et al. (2009)	Agronomy for Sustainable Development, 29(4), pp. 503-515	425
Brown (1975)	Advances in Child Development and Behavior, 10(C), 103-1	410
Jarvis & Pavlenko (2007)	Crosslinguistic influence in language and cognition, in Crosslinguistic Influence in Language and Cognition, pp. 1-287	370
Rousseau & Tijoriwala (1998)	Journal of Organizational Behavior, 19(SUPPL.), pp. 679-695	355
Ingold (2006)	Ethnos, 71(1), pp. 9-20	345
Wilson & Sperber (2012)	Meaning and Relevance, pp. 1-382	332

Table 3. Top citation of article/document of 2011-2020

Author (s)	Sources	∑ citations
Ingold (2011)	Being Alive: Essays on Movement, Knowledge and Description, pp. 1-270	1718
Atran (2011)	In Gods We Trust: The Evolutionary Landscape of Religion, pp. 1-364	665
Wilson & Sperber (2012)	Meaning and Relevance, pp. 1-382	332
van Dijk (2014)	Discourse and knowledge: A Sociocognitive Approach, pp. 1-400	126
Sinkovics & Alfoldi (2012)	Management International Review, 52(6), 817-845	124
Altieri (2018)	Agroecology: The Science of Sustainable Agriculture, Second Edition, pp. 1-433	123
Fowles (2013)	An Archaeology of Doings: Secularism and the Study of Pueblo Religion, pp. 1-306	112
Alves & Souto (2015)	Ethnobiology and Conservation, 4(2015),1	100
Devente et al. (2016)	Ecology and Society, 21(2),24	92
Kemp & Regier (2012)	Science, 336(6084), 1049-1054	80

Publication Patterns: Source Titles (Journal or Proceeding)

Table 4 illustrates the most contribution journal or proceeding on the research of ethnoscience. Journal of Physics Conference was a leading conference series that which contains articles about ethnoscience. Meanwhile, Journal Ethnobiology & Ethnomedicine and Journal

Pendidikan IPA Indonesia were the leading journal that was covering this topic in their content. The remaining journals were Ethnobiology & Conservation, Environ. Educ. Res., Int. Encyclopedia Soc. Behav. Scie. Sec. Ed., Revista de Chimie, Routledge Int. Handbook Qual. Nursing Res., A Companion to Cognitive Anthropology, Approaches to Language Culture & Cognition, Biodiversity & Conservation, *Boletim Do Museu Paraense Emilio Goeldi Ciencias Humanas*, Current Anthropology, Ethnobiology, etc. (see Table 4).

Table 4. Number of documents of ethnoscience (2011-2020) across source titles

No	Source Titles	Number of documents
1	J. Phys. Conf. Ser.	32
2	J. Ethnobiology & Ethnomedicine	12
3	J. Pend. IPA Indonesia	11
4	Ethnobiology & Conservation	5
5	Environ. Educ. Res.	4
6	Int. Encyclopedia Soc. Behav. Scie. Sec. Ed.	4
7	*Revista de Chimie*	4
8	Routledge Int. Handbook Qual. Nursing Res.	4
9-18	A Companion to Cognitive Anthropology Approaches to Language Culture & Cognition Biodiversity & Conservation *Boletim Do Museu Paraense Emilio Goeldi Ciencias Humanas* Current Anthropology Ethnobiology Forest Ecology & Management Int. J. Scientific & Tech. Res. *J. De La Societe Des Oceanistes* J. Ethnobiology	3

Visualization of Research Trends on ethnoscience based on VoSViewer Software

Among those 536 papers related to ethnoscience research in the Scopus database, the researchers visualized the research trends on this topic assisted with *VoSViewer* software. This effort helps find the novelty of the research on this domain. Figure 8 indicates the whole picture research on ethnoscience. Researchers on the world produced three primary clusters indicated with red, green, and blue) and one secondary cluster (yellow). The first cluster (red color) was ethnoscience management in the world. The second cluster (green) was ethnoscience related to the academic domain, anthropology, history, and other social sciences. The third cluster (blue) was ethnoscience in connecting with the data collecting process. The last cluster (yellow) indicated ethnoscience relating to its effect, lack, and benefit to society as a participant.

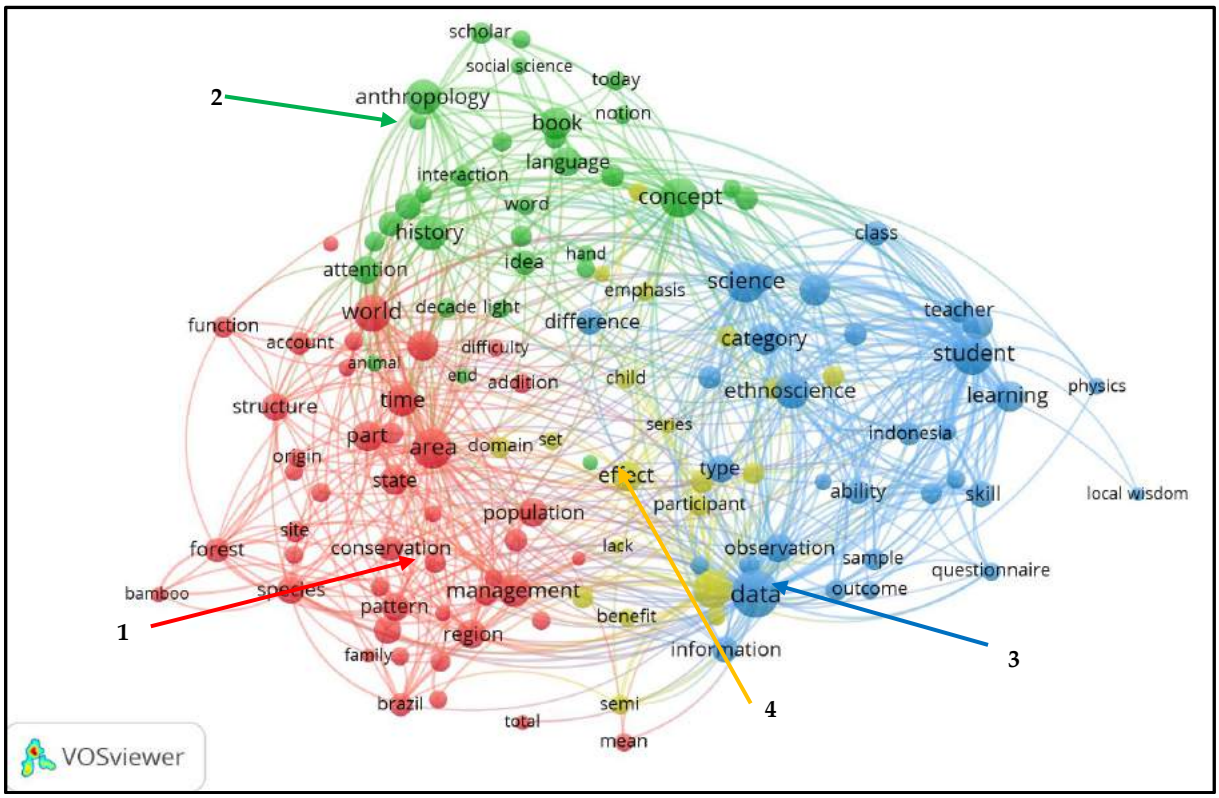


Figure 8. The whole picture of research on ethnoscience during 2011-2020

If we broke down into the specific connection among variables to capture the trend and novelty of researching ethnoscience, we found some findings. Figure 9a emphasized that research on ethnoscience in the educational domain. It related to student, class, school, and learning. Indonesian researchers examined this point more—meanwhile, science and ethnoscience connect with other specific domains, as illustrated in Figure 9b.

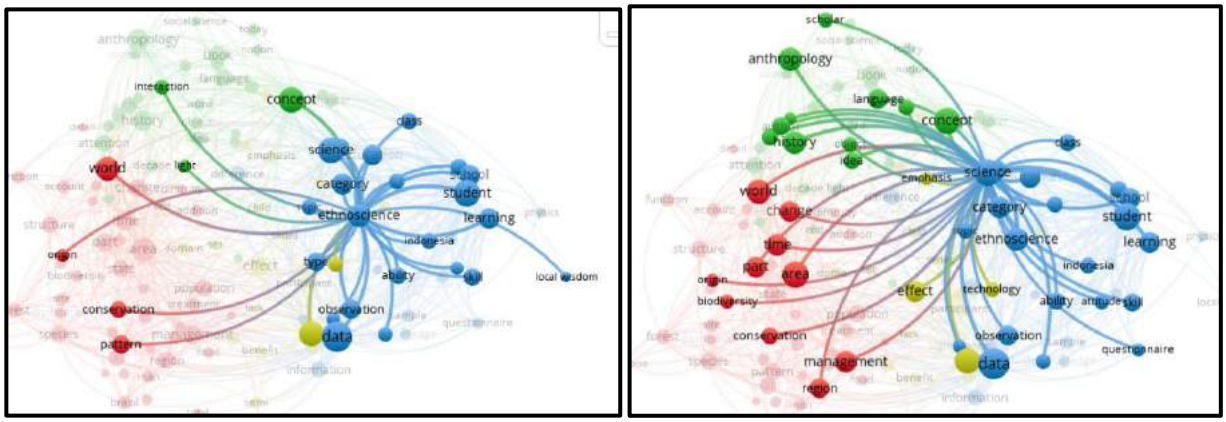


Figure 9. (a) Ethnoscience in educational domain; (b) science, ethnoscience, and other academic domains

The dominance of social sciences and humanity branch such as anthropology, history, language and culture gave impact on the research on ethnoscience during 2011-2020 period (Figure 10). It has also possible to involve sociology that covers the interaction and structure among object, people, and living things.

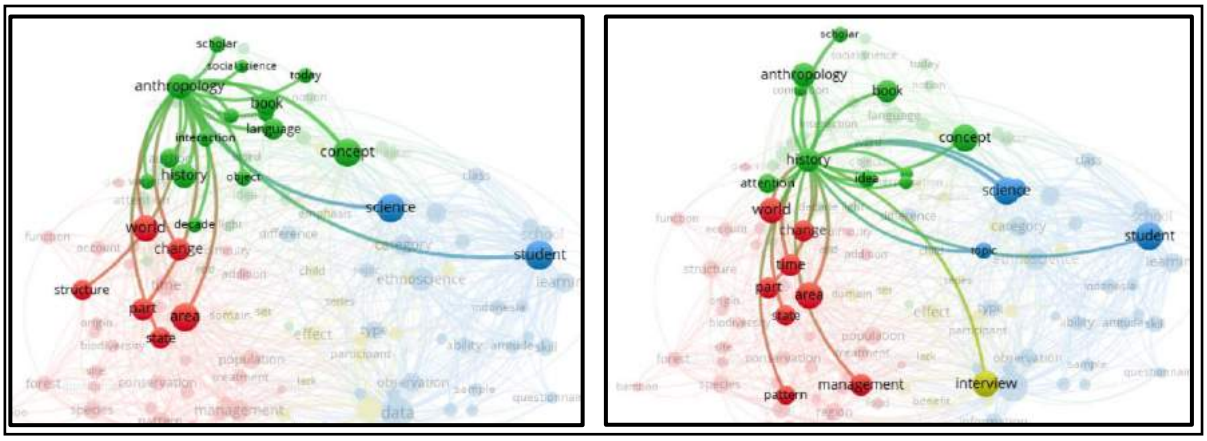


Figure 10. The dominance of social sciences in influencing research on ethnoscience

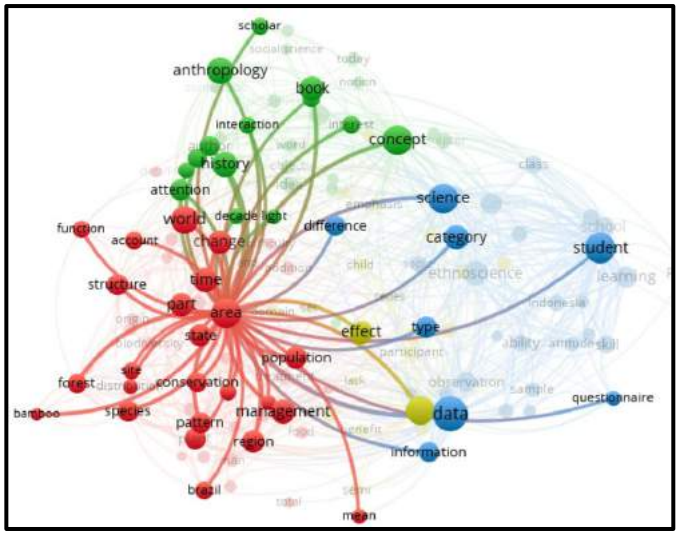


Figure 11. Research focus on ethnoscience in some area in the world

Research on ethnoscience around the world emerged from conservation in the forest, some plants (such as bamboo) and species in some area to manage some information and data related to studies of ethnoscience and how it integrates with the several academic domains as indicated in Figure 11. The map was also informed us of research on ethnoscience, consider the history and timeline-based. On the other hand, Figure 12 illustrated various data collecting in researching ethnoscience, such as observation, interview, questionnaire, semi-structured interview. It means research on ethnoscience used both quantitative and qualitative paradigm. Completely, there were some occurrent key words support the data collection process: ability, attitude, skill, learning, science, physics, school, treatment, population, category, concept, management, pattern, type, and effect. Furthermore, the term Indonesia and Brazil have also dominated as the keyword in researching ethnoscience (Figure 13).

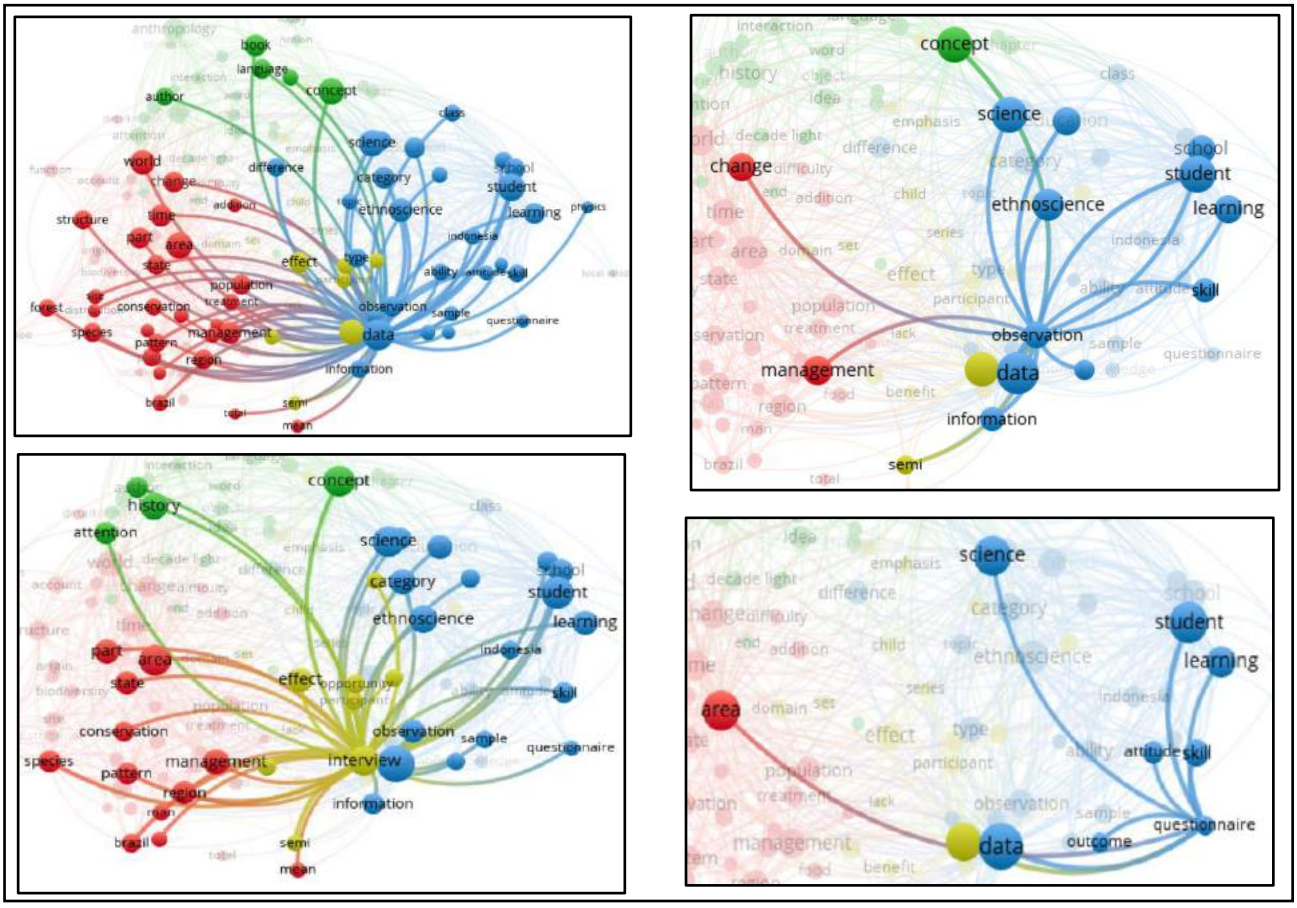


Figure 12. Research on ethnoscience based on data collection

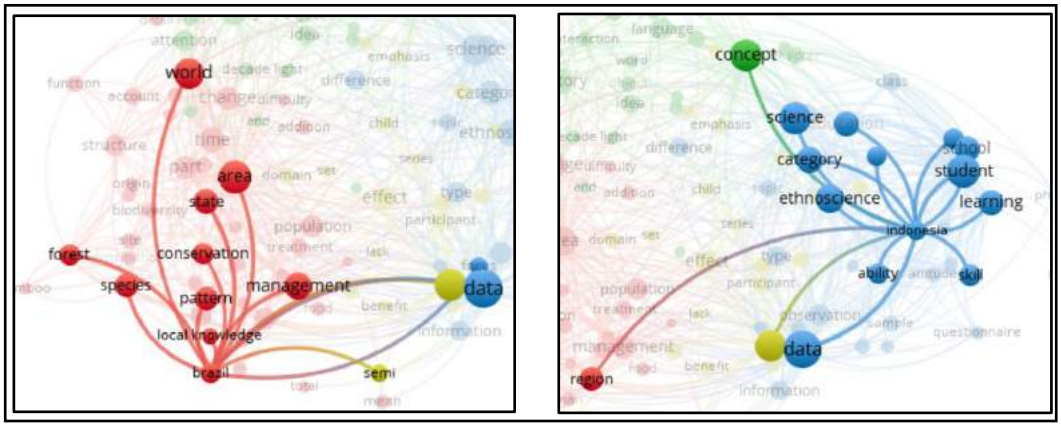


Figure 13. Brazil and Indonesia dominated in searching keyword

Figure 14 showed the top researcher and its cluster in researching ethnoscience. There were six dominant groups of authorships: Sumarni *et al*., Graffigna *et al*., Murrieta *et al*., Sandu *et al*., Belmain *et al.*, and Albuquerque *et al*. W Sumarni, a researcher from Indonesia, have become a leader among all clusters. Her co-authorship included Setiawan and Atmojo. On the other hand, Grafiggna was the most influenced researcher on ethnoscience in 2011-2020, which is indicated by the largest circle.

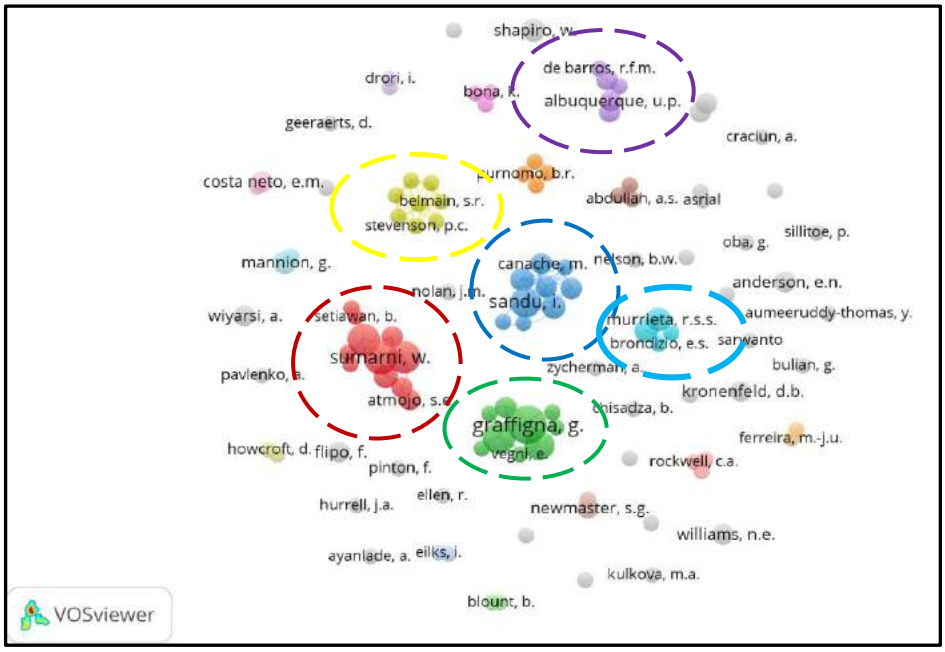


Figure 14. Top authors and co-authorships and the most influenced authors on ethnoscience

The Contribution of Indonesian Researchers on ethnoscience

In total, Indonesia contributed 76 documents related to ethnoscience in the last ten years from a total of 536 documents. Of this number, it was 37 belongs to the proceedings or the results of the conference paper, while the remaining 39 is in the form of journal papers.

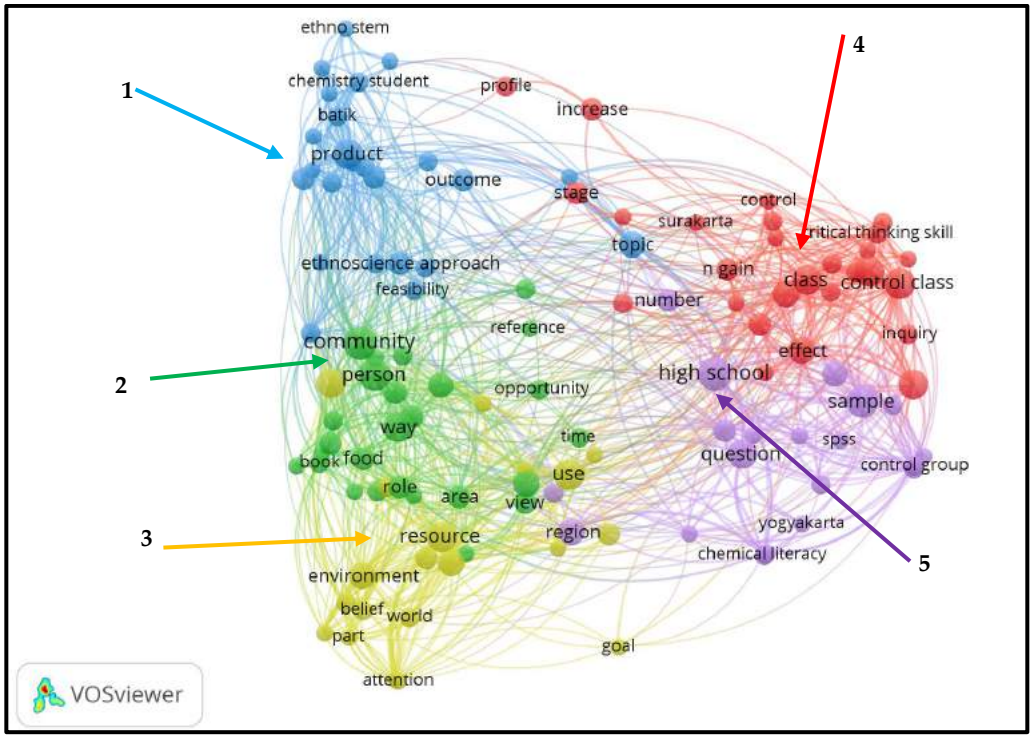


Figure 15. The whole picture research on ethnoscience performed by Indonesian researchers during 2011-2020

If researchers in the world produced 4 clusters related to trends research on ethnoscience, then there were five clusters produced by Indonesian researchers. The first cluster (red color) was ethnoscience in relating to critical thinking and inquiry. Meanwhile, the second cluster (yellow) was ethnoscience related to its resource, environment, belief, person and attention. Then, the third cluster (green) was ethnoscience in connecting with community, food, area, view, and role. Then, the fourth cluster (purple) was ethnoscience in connecting with chemical literacy and high school. The last cluster (blue) indicated ethnoscience under its ethnoscience approach, product, *etnostem*, *batik*, and feasibility.

Table 5. Number of documents of ethnoscience among Indonesian institution (2011-2020)

No	University	Number of documents
1	*Universitas Negeri Semarang*	20
2	*Universitas Negeri Yogyakarta*	8
3	*Universitas Sebelas Maret*	6
4	*Universitas Padjadjaran*	4
5	*Universitas Negeri Padang*	4
6	*Universitas Negeri Surabaya*	3
7	*Universitas Negeri Jakarta*	3
8	*Universitas Jambi*	3

Table 5 illustrates how the rank of Indonesian institution in producing documents on ethnoscience. All the top eight are teacher-producing universities and public universities in Indonesia. Universitas Negeri Semarang is the top university on researching of ethnoscience. Meanwhile, Figure 14 depicts the top Indonesian researchers on ethnoscience and their co-authorships. It lists that the name such as Sumarni (8) and Sudarmin (7) were the most productive authors in this topic from Indonesia.

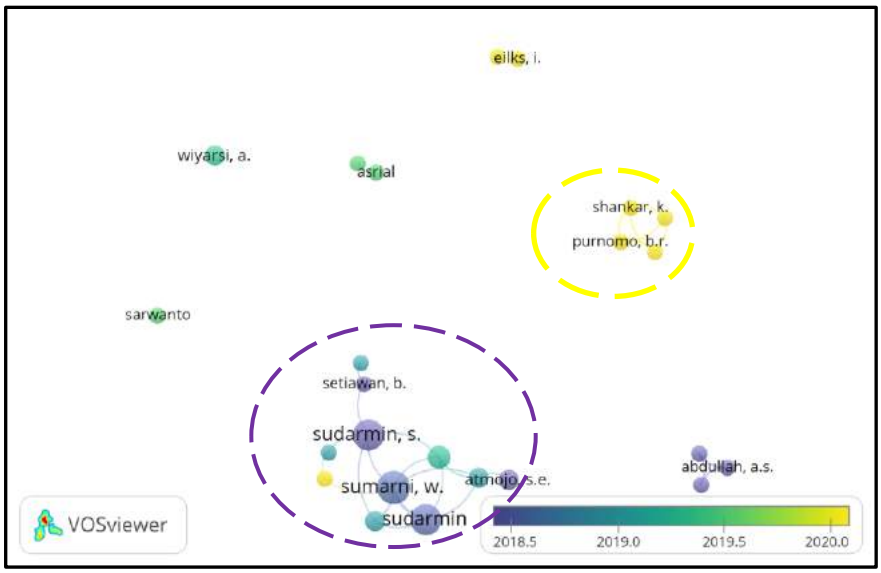


Figure 16. Top Indonesian researcher on ethnoscience and co-authorships

It was no different rank from the world in terms of ethnoscience from Indonesia (2011-2020) across source titles, Journal of Physics Conference was a leading conference series which contains articles about ethnoscience. Meanwhile, for the journal category, *Jurnal Pendidikan IPA Indonesia*, which is also from Indonesia, is also superior in producing ethnoscience documents.

Table 6 also indicates that Indonesia's contribution to research on ethnoscience is more in the proceedings than in the journal.

Table 6. Number of documents of ethnoscience from Indonesia (2011-2020) across source titles

No	Name of Journal or Conference	Number of documents
1	Journal of Physics Conference Series	32
2	*Jurnal Pendidikan IPA Indonesia*	11
3	International Journal of Scientific and Technology Research	3
4	Applied Mathematics and Information Sciences	2
5	International Journal of Evaluation and Research in Education	2
6	IOP Conference Series Earth and Environmental Science	2
7	Journal of Turkish Science Education	2
8	*Opcion*[¥]	2
9	Universal Journal of Educational Research[¥]	2
10	Advanced Science Letters	1

Note: [¥]The journal was discontinued from Scopus in 2020

4. Discussion

The term ethnoscience first appears in 1967 in American Behavioral Scientist, by Werner (1967). The number of documents of ethnoscience across the year was increased significantly. It was less than 30 documents before 2010 and more than 30 documents each year in 2011-2020. Even though it fluctuated in duration 2013-2018, the trend increased in 5 decades. It can be predicted that the number of articles in 2021-2025 will increase dramatically.

Based on the number of documents across countries, it was clear the dominance of the USA with 124 documents from 2011 to 2020. Countries such as Indonesia, UK, and Brazil contributed to this topic with 76, 47, and 45 documents. Indonesia places its two institutions in the first and sixth rank. Universitas Negeri Semarang (UNNES), Indonesia, has ranked first with 20 documents and was followed by the *Università Cattolica del Sacro Cuore*, Italy. Meanwhile, other institutions were dominated by Brazil and the USA.

Sudarmin, Graffigna, Sandu, Sumarni, Olson, Barello, Chirazi, Mannion, Murrieta, Prado, Shapiro and Wiyanto were the most productive authors. Meanwhile, with 1718 citations, Ingold was the most authors with the top citation of the article all years. It was listed that Ingold (2011), Atran (2011), Wilson & Sperber (2012), van Dijk (2014), Sinkovics & Alfoldi (2012) resulted in their articles as the top 5 citations in 2011-2020. Journal of Physics Conference was a leading conference series that contains articles about ethnoscience. Meanwhile, Journal Ethnobiology & Ethnomedicine and Journal Pendidikan IPA from Indonesia were the leading journals covering this topic in their content.

Researchers in the world produced three primary clusters and one secondary cluster. The first cluster was ethnoscience management in the world. The second cluster was ethnoscience related to the academic domain, anthropology, history, and other social sciences. The third cluster was ethnoscience in connecting with the data collecting process. The last cluster indicated ethnoscience relating to its effect, lack, and benefit to society as a participant.

If we broke down into the specific connection among variables to capture the trend and novelty of researching on ethnoscience, then we found some findings:

1. Research on ethnoscience in the educational domain related to student, class, school, and learning. Indonesian researchers more examined this point.

2. Science and ethnoscience are connecting with other specific domain.
3. Research on ethnoscience around the world emerged from conservation in the forest, some plants and species in some area to manage some information and data related to studies of ethnoscience and how it integrates into the several academic domains.
4. Research on ethnoscience considers the history and timeline-based.
5. Various data were collected in researching ethnosciences, such as observation, interview, questionnaire, and semi-structured interview.
6. The term Indonesia and Brazil have also dominated as the keyword in researching ethnoscience.

There were six dominant groups of authorships: Sumarni *et al*., Graffigna *et al*., Murrieta *et al*., Sandu *et al*., Belmain *et al.*, and Albuquerque *et al*. as the top researcher and its cluster in researching ethnoscience. Woro Sumarni, a researcher from Indonesia, has become a leader among all clusters (Sumarni, & Kadarwati, 2020; Sumarni, Sudarmin, Wiyanto, Rusilowati, & Susilaningsih, 2017). On the other hand, Grafiggna was the most influenced researcher on ethnoscience in 2011-2020.

5. Conclusions

In this work, the authors used bibliometric methods to study the state of research of a particular knowledge area. The development of ethnoscience, identifying the primary sources where research papers are published, the most important countries and institutions where research carried out, the individual top active researchers, the most cited authors in the field, as well as the main topics of interest in ethnoscience were the focus of the study.

The authors indicated some significant points regarding the research on ethnoscience during the period from 2011 to 2020. The number of documents of ethnoscience across the year was increased, which were dominated by articles in the journal. Secondly, the USA contributed the most documents on ethnoscience, and Indonesia's institutions dominated this area. Indeed, Indonesia put its two representative's institutions: Universitas Negeri Semarang and Universitas Negeri Yogyakarta, among the big ten institutions in the world. The USA and Indonesia have also contributed to the most productive authors of ethnoscience. Then, the visualization of research trend on ethnoscience resulted in three major clusters and one minor cluster:

1. Ethnoscience management in the world
2. Ethnoscience in relating to academic domain, anthropology, history, and other social sciences
3. Ethnoscience in connecting with data collecting process
4. Ethnoscience in relating to its effect, lack, and benefit to society as a participant

The research findings could aid related researchers to recognize the trend of ethnoscience research globally and recommend directions for further research.

Acknowledgements

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Dokumen pendukung luaran Tambahan #1

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Dokumen sudah diunggah:
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Research Trend of Socio Scientific Issues (SSI) in Physics Learning Through Bibliometric Analysis in 2011-2020 using Scopus Database and the Contribution of Indonesia

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Abstract: Socio-Scientific Issues (SSI) are controversial topics that have a scientific basis and important to society. This study aims to analyze the trends of SSI research publications from 2011-2020, visualize SSI research trends and how Indonesian researchers contribute to SSI research. This study was conducted on April 18, 2021, using bibliometric analysis. Data obtained is 225 data and taken by using Scopus database with "socio-scientific issues in physics" as the keyword from 2011 until 2020. After that, the data mapping was carried out using VOS Viewer software. Based on the result research, it can be concluded that the most topic in SSI research is related to scientific literacy, argumentation, and global warming. The visualization result shows that SSI has many effects on science learning, especially to improve argumentation skills. From 35 countries, Indonesia became the largest contribution research documents in SSI by placing two representative institutions: Universitas Pendidikan Indonesia and Universitas Negeri Yogyakarta. Indonesia also contributed the most prolific SSI writer, Widodo became the most prolific writer.

Keywords: Socio scientific Issues; Bibliometrics; VOS Viewer; Scopus

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Introduction

The development of technology and science (IPTEK), especially in the 21st century, cannot be avoided in education. Technology and science play a part in bringing superior generations to produce human resources who can communicate and collaborate in using technology. According to Murti (2015), innovative and learn skills, as well as applying information media and technology, being able to survive and work are very much needed. In order to continue for using life skills.

The 2013 curriculum emphasizes the existence of social scientific issues in learning activities (Rahayu, 2015). SSI are contemporary controversial issues that arise due to advances in technology and science (Ozden, 2015). Using SSI as a learning displays controversial social issues that related to science daily (Zeidler et al., 2005)

Research on SSI in physics, especially in physics learning, has been studied by several researchers. Among them, the research result which conducted by Izma et al. (2019) stated that SSI-based teaching materials affected in increasing student's understanding of the Nature of Science (NOS). The study is focused on the relevance content to each aspect of NOS. Meanwhile, Dawson and Charson (2018) conducted a study about the introduction of SSI arguments related to climate change, they are found

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that the implementation of SSI can improve argumentation skills.

Dawson (2015) also conducted a study about the application of SSI that can improve conceptual understanding. In his study, students provide accurate definitions of the greenhouse effect and climate change. Through scientific and social problems, students are taught to solve problems in society based on scientific knowledge (Hendri and Defianti, 2019). Unfortunately, the results of Deni's research (2018) prove that the quality of junior high school students' arguments in SSI is still deficient. They can only make claims and rebuttals but still difficult to make excuses (data, warrants, and backing). The difficulty of making excuses is based on the students' understanding of the concepts themselves.

The low quality of this argument cannot be separated from how teachers implement SSI in the context of learning. As a result, the application of SSI as a lesson study in several countries is still rarely carried out by teachers. Genisa et al. (2020) have researched and studied the implementation of SSI in teaching materials. The research method is carried out by reviewing and searching the literature. However, analysis by bibliometric method using the Scopus database has never been carried out, so this research was conducted to examine scientific research from 1986 to 2021 through the bibliometric analysis method by taking data from Scopus.

Based on the background description above, the purpose of this study is to analyses the implementation of Socio Scientific Issues as a physics learning context and research/publication trends (2010-2020) in the Scopus database using VOS viewer software. It is about the publication outputs, document sources and language sources of SSI from 2011-2020, the distribution of SSI research across countries and agencies, the top research authors of SSI in the world, the visualization of SSI research trends, Indonesia research contribute to SSI.

Method

The type's research of this study is descriptive research which was analyzed by using the bibliometric analysis method. The research was sourced from the Scopus database, which was taken from the Scopus web (www.scopus.com). Scopus was chosen because it is the largest academic database globally with citations that provide abstracts from various scientific and research literature that have been reviewed (Tupan et al., 2018). So, the Scopus database is effective for visualizing, tracking and analyzing research.

The data was carried out on April 18, 2021, with the keywords of the title and abstract is "socio", "scientific", "issue", and "in physics" from 2011 until 2020. The data obtained in the form of the publication numbers each year, authors, and journals that contain articles in physics. Furthermore, the search results in the form of data samples are downloaded in .ris and .csv formats. This research are analyzed using VOSviewer software from three types of mapping produced, namely network visualization, overlay visualization and density visualization.

Research subjects were analyzed by using Microsoft Excel 2013. Like the publication trends in SSI field and document's types number was processed by using Microsoft Excel, which was formed into a graph to make it easier for readers to understand this research. After the statistical results are obtained, the mapping data analysis is carried out using VOSViewer.

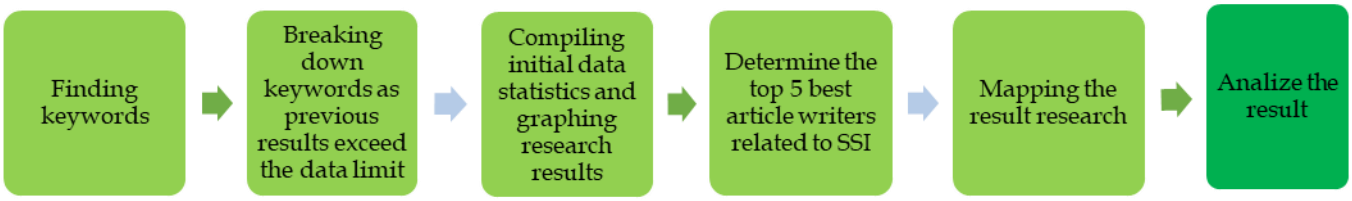

Figure 1. Steps to conduct research with bibliometric analysis

Result and Discussion

Publication Result, type of document and Language.

From the data search results there were 225 document. The distribution of articles each year is described in figure 2. There are seven document sources of Socio-scientific issue (SSI) research in physics from the Scopus database, including articles, conference papers, conference reviews, reviews, book chapters, books, and editorials. The published documents are starting in 2011 and until 2020. The publication number from 2011 to 2020 can be shown in Figure 2. From that graph, it can be seen that there are an enhancement in the document's number from 2011 to 2020. One of the authors who published research documents in 2011 was Soresen (2011) with his document that discusses about renewable energy. In the document, it is written that several solutions for

renewable energy become a sustainable system, and useful in daily life. The comprehensive documents decreased in 2016, while in 2019, there are a significant enhancement in the total documents from 18 to 46 documents. Furthermore, in 2020, the number of research documents did not decrease.

Figure 2. Graph of Number Publication Years 2011-2020

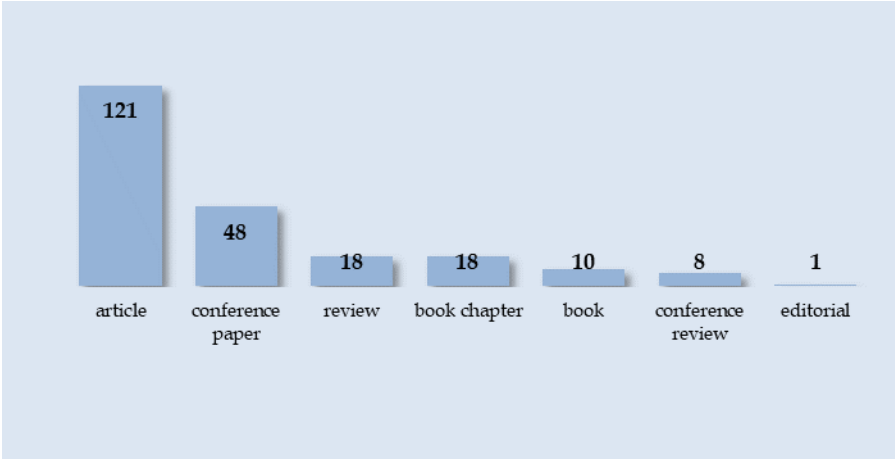

Figure 3. Graph of Document's type

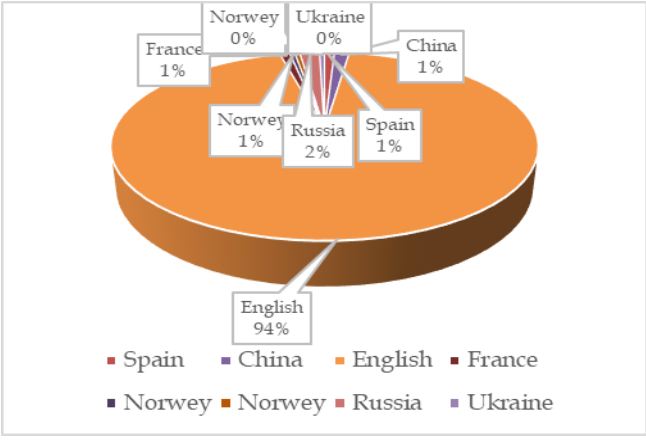

Figure 4. Graph of Language

The publication numbers based on the document's type shows that the article was dominant, which is 225 documents (figure 3). The editorial has the least publication numbers. Tytler R. (2012) wrote the type of editorial about socio-scientific Issues, science education and sustainability. This paper describes the perspective of SSI and sustainability related to science education. The most of documents used English, which as much 211 documents or 94%. This data can indicate that most of the publications on SSI are from the international level because most of the language used is English. Moreover, the least document are in Norwegian and Ukrainian, with a percentage of less than 1% with 1 document (Figure 4).

The Result of Cross-country publications

Based on the number of cross-border's document, it can be seen that the most significant document number was dominated by Indonesia, with 29 documents from 2011 to 2020. Countries such as Russia and the USA contributed to this topic with 20 and 18 documents, respectively. Meanwhile, with almost the same amount, China, Australia, France, Sweden and Switzerland donated between 8-7 documents.

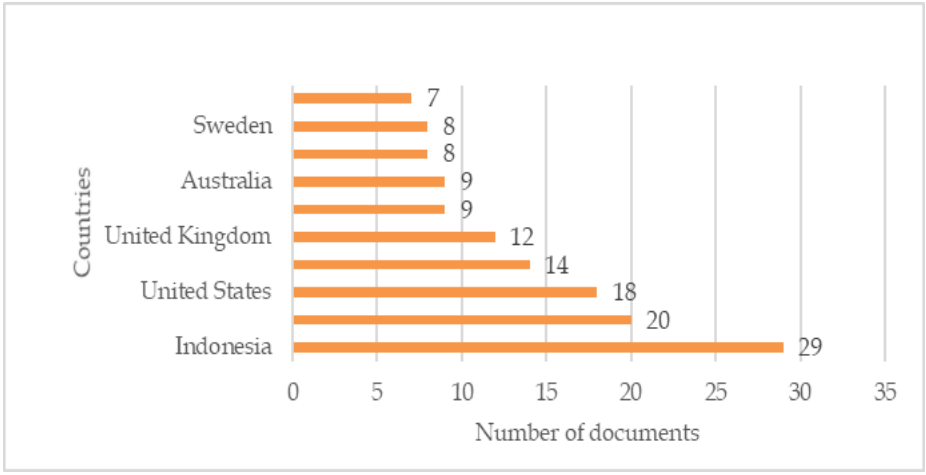

Figure 5. Distribution of the Top 10 countries contributions

Figure 6. Cross-country of SSI distribution

Meanwhile, to see as a whole, the distribution of SSI research can be seen in Figure 5, which is about the cross-country distribution of SSI. In this figure, it can be seen that Indonesia dominates the number of researches on SSI. This is shown in the figure that the Indonesian region is dark brown and the oldest among other regions. It is followed by Russia and America. The areas of Australia, Korea, China are also quite dominant. However, some areas that are not brown does not mean that there is no research at all, but it is still quite rare.

Table 1: Rank of the top 5 agencies with the most document contributions

Rank	Affiliation	Document number
1	Universitas pendidikan Indonesia	11
2	Moscow State University	6
3	Russian Academy of Science	5
4	University of Missouri	4
5	universitas negeri Yogyakarta	3

The number of SSI documents (2011 – 2020) across all institutions can be seen in Table 1. Singapore places the two institutions, namely the Indonesian Education University with 11 documents ranked first and Yogyakarta State University ranked fifth with three documents. Meanwhile, Russia placed two representatives, namely Moscow State University and the Russian Academy of Science, in rank 2 and 3. In comparison, America (USA) placed one representative in fourth place, namely the University of Missouri.

From table 1, it shows that Universitas Pendidikan Indonesia have the largest contribution in SSI Research. One of the research from Universitas Pendidikan Indonesia is from Hendrayatno, et al (2020). The study is about Genetics in socio scientific issues, focus on Measuring rebuttal abilities in scientific argumentation. In the second place, there is Moscow State University. One of the documents was conducted by Zaykova (2020) it is about Green Spice for the Megacity and Urbanization. Third, there is Russian Academy of Science. On of the documents was conducted by Sukhodolov et al. (2019). It is about mathematical modelling of assessing the number of Baikal omul in

the socio-economic and legal aspects of environmental law violations. Fourth, there is the University of Missouri, and one of the research is about teachers select SSI material for teaching (Hancock et al. 2019). Fifth, there are Universitas Negeri Yogyakarta with one of the research that conducted by Dhisadewi (2020) it's about Chemistry-based socio-scientific issues (SSis) as a learning context: An exploration study of biofuels.

Top SSI Related Research Writers

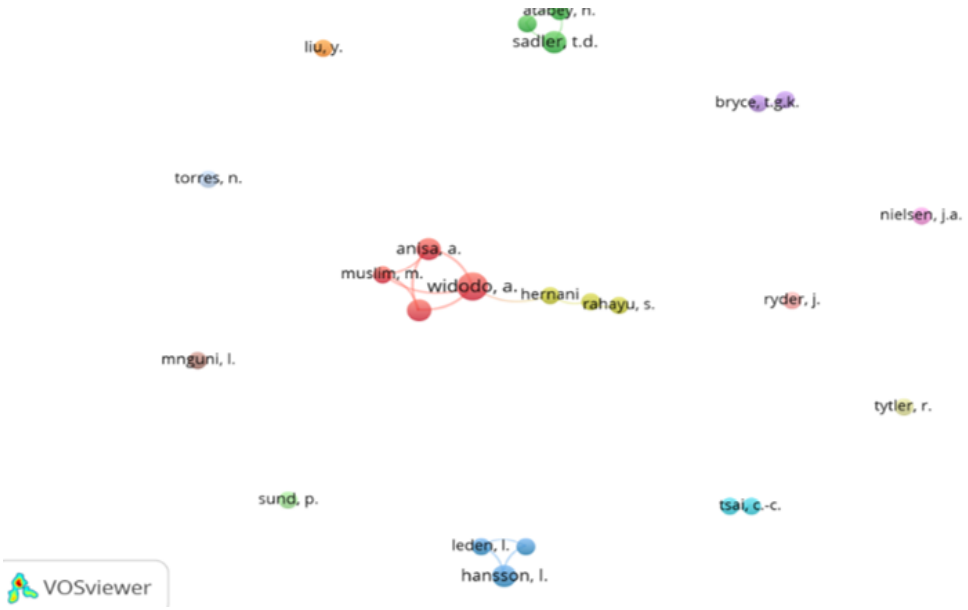

Figure 7. Top authors of SSI research

The most productive authors on research on SSI in physics are shown in Figure 7, which shows the top authors and their clusters in research, which indicates that the authors are productive in research on SSI in physics. Widodo, A., et al. lead cluster 1, which is shown in red. One of the research from Widodo, et al (2019) is about genetics in socio scientific issues: Measuring rebuttal abilities in scientific argumentation. They were then followed by Sadler, T. D., et al. in cluster 2. One of the research from Topcu et al (2018) is about the classroom observation protocol for socioscientific issue-based instruction: development and implementation of a new research tool. And Hansson, I. and Leiden, I. in cluster 3 and the lead in a cluster wich one of the article is about working with the nature of science in physics class: Turning 'ordinary' classroom situations into nature of science learning situations (Hansson and Leiden.2016) From the results of the mapping, it can also be seen that SSI research in Indonesia is quite popular because the author's mapping results show that there are researchers from Indonesia who are quite dominating, namely Widodo, A. et al. from the University of Education Indonesia.

SSI Research Trends Visualization in Physics using VOSViewer

From 225 documents related to SSI research in the Scopus database, the research trends on this topic were then visualized with the help of VoSViewer software. This effort helps find the novelty of research in this domain. The study results indicate several essential parameters or interrelationships between variables in SSI, such as the presentation of SSI in science learning, SSI issues, SSI with teaching materials, SSI related to skills, and global warming with SSI.

The coloured circle shows items or keywords and obtained as many as 104 items or keywords in the title and abstract. The size of the circle also indicates how often the research is related to the topic. If the size of the circle is getting bigger, the keywords that appear are also more frequent.

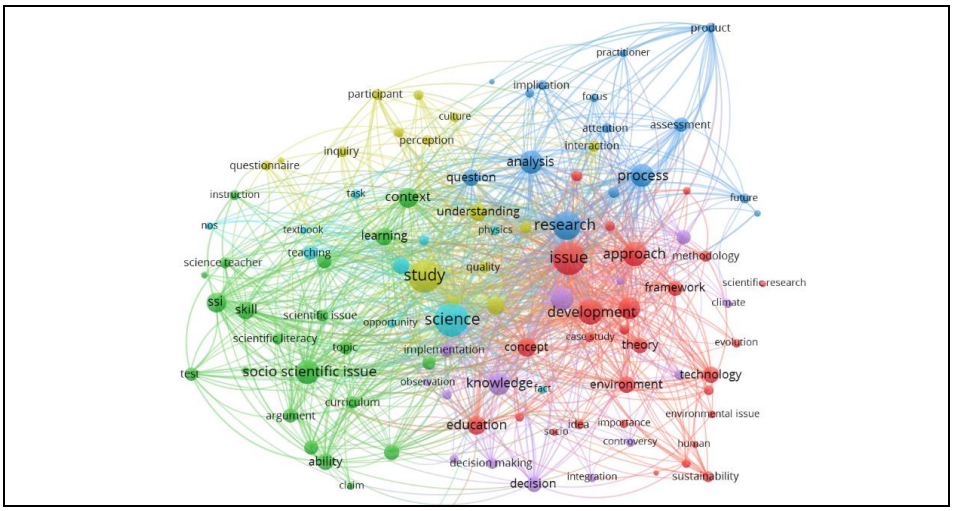

Figure 8. Network visualization of SSI research

From the mapping results, there are 6 clusters (red, blue, purple, green, yellow and light blue) that show a relationship between one topic and another (figure 8). Cluster 1 is shown in red. Cluster 2 is green. Cluster 3 is blue, cluster 4 is yellow, cluster 5 is purple, and cluster 6 is light blue. The focus of this research is the keyword socio-scientific issue which is in cluster 2 and has quite a several items related to SSI. (Figure 9).

Curriculum, science education, argumentation, learning, and context items are the same cluster with SSI. The skills show that the seven keywords have a reasonable close relationship. The word curriculum and science education related with SSI, it can be shown in the the figure 10. SSI can be implemented into curriculum design as a learning strategy to improve students' understanding, knowledge and development skills regarding science. Therefore, SSI is closely related to science education because SSI context are authentic, current, scientific, controversial and need to be discussed (figure 10b). This relationship can be said to be logical, as stated by Dawson and Carson (2018) that SSI is a controversial issue that has a scientific basis and is essential or public concern.

The application of SSI also affects some skills (figure 11). The skills show that the two keywords have a reasonable close relationship. SSI can be closely related to several skills such as argumentation, reasoning, scientific literacy, scientific processes, and understanding, as shown in the distribution of skill items. For example, while SSI was implemented in a learning context, it will be influence the quality of argumentation. Triani et al. (2020) research proves that there are an enhancement of students' scientific argumentation skills using the SSI learning strategy. Dawson and Carson (2018) also prove that the implementation of SSI in the context of learning can increase students' understanding of climate change.

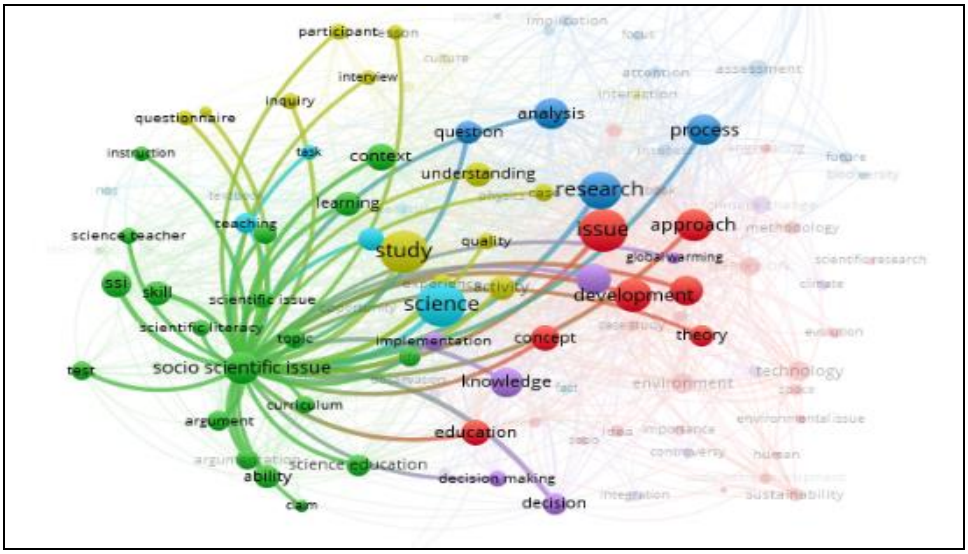

Figure 9. Visualization focusing on the SSI word

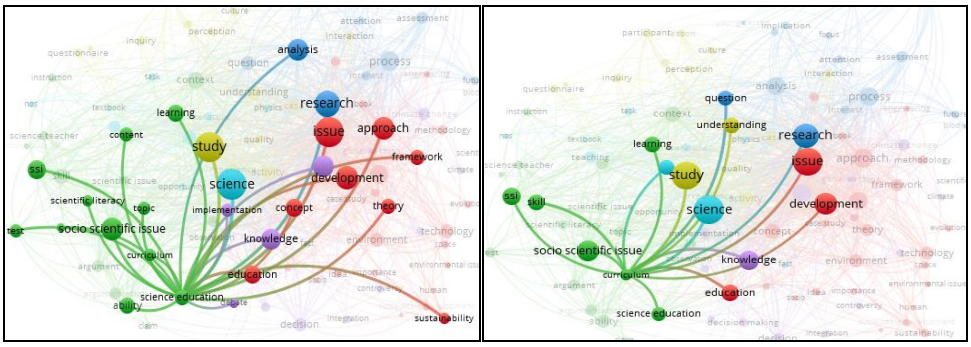

Figure 10. The relationship between SSI, curriculum and science education words

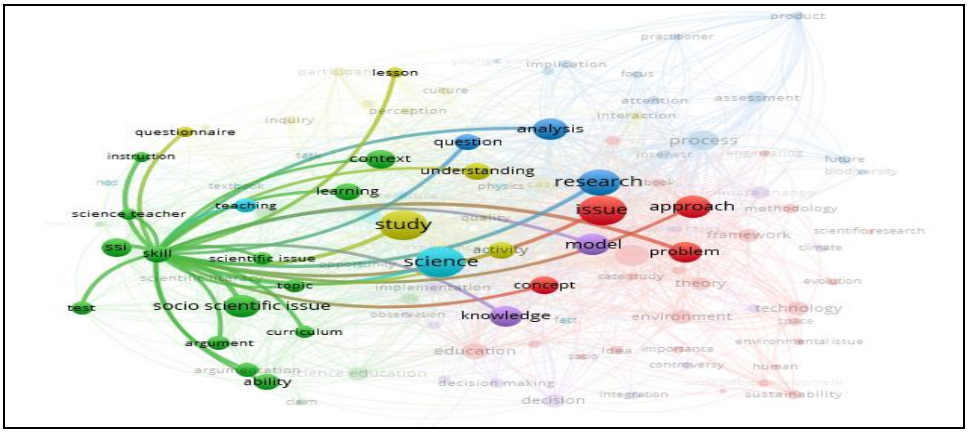

Figure 11. SSI related with some skill

The argumentation word is also in the same cluster with SSI. This relationship also means that the four words are closely related. From the mapping results, it can be seen that when SSI is applied as a learning context, it will affect the ability to argue scientifically (figure 12). The effect of SSI on improving the quality of students' argumentation has been proven in the research of Siska et al. (2020), where the implementation of SSI in learning strategies can improve the quality of students' scientific arguments. The implementation of SSI in learning also affects students' understanding (knowledge). These results are the following research conducted by Izma et al. (2019) regarding the use of teaching materials based on socio-scientific issues for improving understanding of the nature of science. Based on the search results, the keywords Science, study and issue often appear in several research articles. Which are indicated by the appearance keywords in yellow, as well as for socio-scientific issues and physics in yellow opaque (figure 13), which means the keywords socio-scientific issue and physics. It Has appeared quite a lot in titles and abstracts in several scientific articles. One of the keywords that do not appear often is natural science and decision making, which are still green in color.

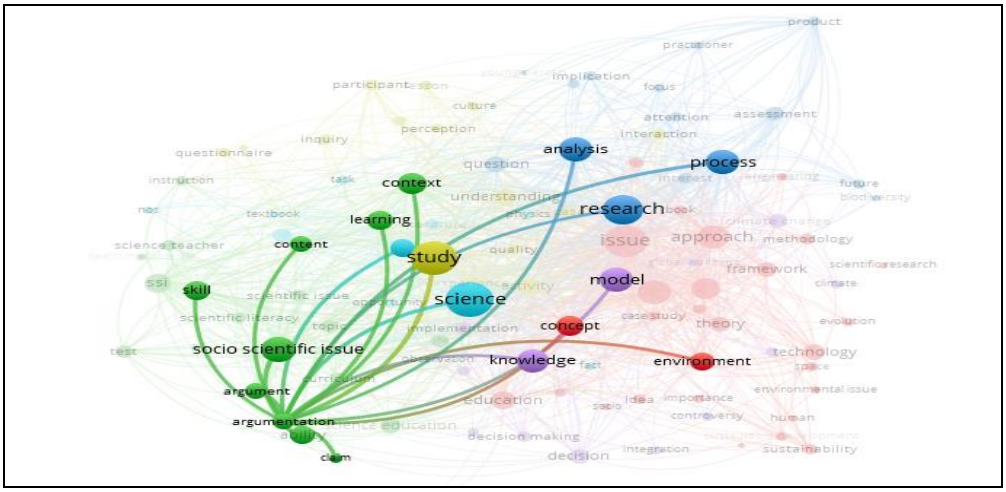

Figure 12. SSI related with argumentation

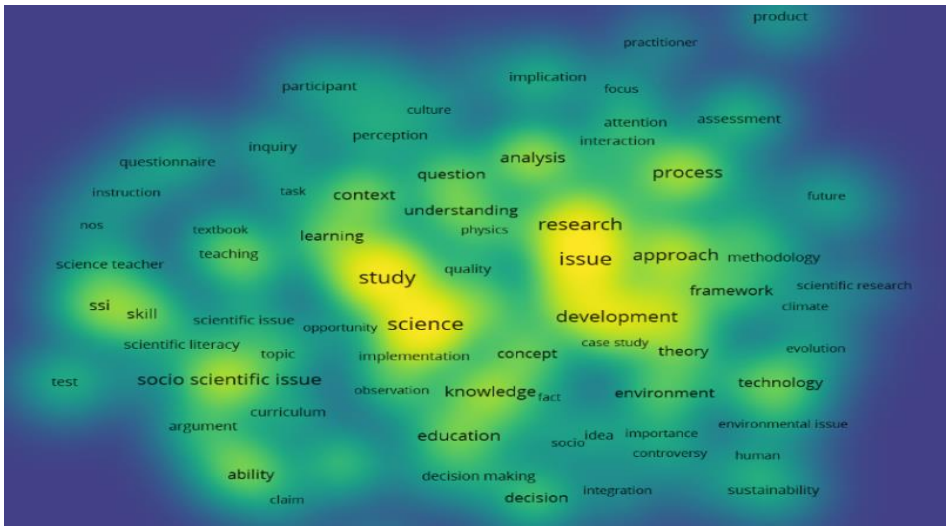

Figure 13. Topic mapping with VOSviewer on density visualization

The results of this study are expected that teachers can consider implementing SSI in a physics learning context. This result is because the issues raised are very current, complex, global, and require further discussion. SSI, which is current and authentic, can encourage students to work with actual events often reported in the media. Even SSI often involves global, regional and local dimensions, which can characterize environmental problems; for example, what is decided at the local level impacts global systems such as water and air systems. Since many issues involve ethical reasoning, decisions or opinions on issues reported in the media today are usually based on knowledge and values.

On the other hand, this research is only limited to analyzing word items obtained based on titles and keywords from the Scopus database. The strength of the relationship is not yet apparent. Data search results can also make it easier to find updates from research on SSI. For example, research on the topic of SSI has a reasonably significant relationship with students' argumentation skills, and it is shown that the SSI keyword is in the same cluster as the argumentation keyword. Because the search results contain the term or keyword stem but do not have a relationship with the SSI keywords and argumentation, the term stem can also be considered for researchers to conduct further research related to socio-scientific issues and argumentation.

Contribution of Indonesian Researchers on SSI.

If we add up, Indonesia has contributed quite a lot of 29 documents out of a total of 225 searched documents. From this amount, it can be seen that it only contributed two types of documents. Namely, conference papers and articles. (Figure.14)

The number of SSI documents from institutions in Indonesia is described in table 2. From table 2, it can be seen that UPI is the top Indonesian institution that contributes the most SSI documents or publications, which is ten documents. One of the authors from UPI is Widodo, A. et al. (2020), who researched the analysis of socio-scientific issues through algorithms.

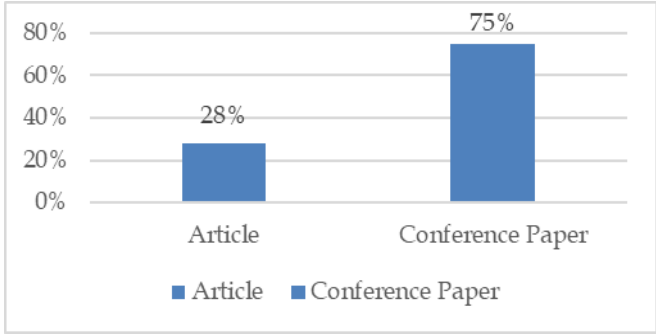

Figure 14. Document source's Graph of Indonesian Researcher

The top SSI researchers in Indonesia are obtained from the ranking results, which can be explained in Figure 15. The mapping results show that the most productive Indonesian writer is Widodo. This has also been explained to the top researchers in the world, where Widodo leads the highest cluster. Widodo contributed as many as five documents in research on SSI. One of the recent studies by Widodo et al. (2020) related to SSI is about SSI analysis through logarithms and exploration of rebuttal complexity in argumentation. Furthermore, Anisa and Riandi occupy the second position in the top SSI researchers in Indonesia. One of the studies conducted was about SSI in genetics, which measures rebuttal ability in the argument of Anisa et al.(2019).

Table 2. The Number of institutional SSI documents in Indonesia.

Rank	Affiliation	Document number
1	Universitas Pendidikan Indonesia	10
2	Universitas Negeri Yogyakarta	3
3	Universitas Negeri Jakarta	2
4	Universitas Negeri Malang	2
5	Universitas Negeri Surabaya	2
6	Universitas Jambi	1
7	Universitas Sumatera Utara	1
8	Universitas Jember	1
9	Universitas Sultan Ageng Tritayasa	1
10	Universitas Negeri Semarang	1
11	Universitas Sebelas Maret	1
12	Universitas Pakuan	1
13	Univesitas Trisakti	1
14	IAN Kediri	1
15	Universitas Ivet Semarang	1

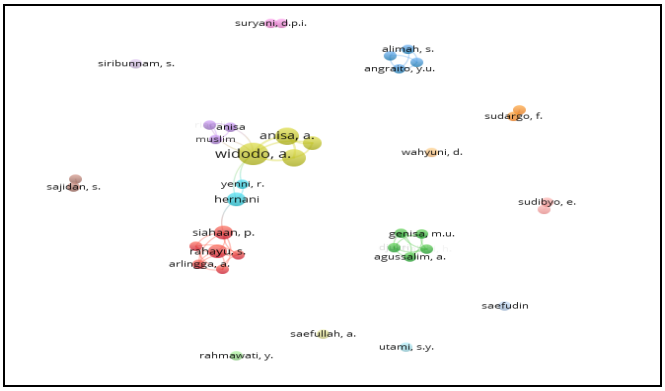

Figure 15. Top of Indonesian researcher in SSI

Conclusion

Based on the result research, it can be concluded that the most topic in SSI research is related to scientific literacy, argumentation, and global warming. The visualization result shows that SSI has many effects on science learning, especially to improve argumentation skills. Several important points have been obtained on the trend of SSI research during the period 2011 to 2020. This research has developed quite significantly starting from 2018. The number of SSI documents throughout the year has increased, which is dominated by articles in journals. Moreover, most of the articles use the international language, namely English. The distribution of SSI research publications across countries shows that Indonesia contributed the most significant number of documents from 35 countries by placing two representative institutions: the Indonesian Education University and Yogyakarta State University. Indonesia also contributed the most prolific SSI writer, namely Widodo. A was ranked first as the most prolific writer. Regarding the visualization of SSI research trends, there are six main clusters with several SSI parameters. From the visualization results, it can also be seen that SSI, if implemented in a learning context, will influence the quality of the argument.

Acknowledgments

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Dokumen pendukung luaran Tambahan #2

Luaran dijanjikan: Artikel pada Conference/Seminar Internasional di Pengindeks Bereputasi

Target: Terbit dalam Prosiding
Dicapai: Accepted

Dokumen wajib diunggah:
1.

Dokumen sudah diunggah:
1. Naskah artikel

Dokumen belum diunggah:
-

Peran penulis: co-author
Nama Konferensi/Seminar: MISEIC 2021
Lembaga penyelenggara: Universitas Negeri Surabaya
Tempat penyelenggara: Virtual zoom
Tgl penyelenggaraan mulai: 4 September 2021 | Tgl selesai: 4 September 2021
Lembaga pengindeks: Scopus
URL website: https://ioppublishing.org/jpcs-forthcoming-volumes/
Judul artikel: Research Trend on Physics Studies in the Qur'an Through Bibliometric Analysis During 2016-2020

Research Trend on Physics Studies in the Qur'an Through Bibliometric Analysis During 2016-2020

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Abstract. The purpose of this study is to analyse research trends regarding the topic of physics studies in the Qur'an during the period from 2016 to 2020 through bibliometric analysis using the Scopus database. The results showed that the number of publications in 2016-2019 increased dramatically. However, after 2019 it decreased in 2020. Conference papers dominated document sources related to this topic using English. Indonesia is the first country to publish the most research on this topic, where Adiwijaya is the most prolific writer who publishes seven documents. The Journal of Physics Conference was contributed the most to the research with 47 documents. Most Indonesian universities researching physics studies in the Qur'an are UIN Sunan Gunung Djati Bandung. However, the most dominating research in this study came from public universities. There are two clusters of visualization of research trends on physics studies in the Qur'an during 2016-2020, including (1) sources of information on physics studies in the Qur'an and (2) implementation of the study of physics in the Qur'an. The results of this study can help researchers recognize research trends on physics studies in the Qur'an over the world and provide direction for further research.

1. Introduction

The Qur'an is a miracle that was revealed to the Prophet Muhammad through the intermediary of the Jibril. The Qur'an contains the content of noble values that cover all aspects of human life in dealing with God, relationships with other human beings, and relationships with the natural surroundings. All Muslims believe in the truth contained in the Qur'an. According to Syukri (2008), the Qur'an is a source of knowledge, both theology and general sciences, including natural science [1]. The Qur'an emphasizes the importance of mastering science and technology. The modern interpretation also explains that the Qur'an is not only the main source of Islamic teachings but also the source and inspiration for the emergence of modern scientific theories. Scientists who use the Qur'an as a source of inspiration in developing their theories are even more convinced that Islam is closely related to modern science. From here, various studies have emerged that reveal the synergistic relationship between Islam (the Qur'an) and modern science, one of which is physics [2]. Knowing, studying, and learning the meaning of the Qur'an is worship with an excellent reward [3]. As a source of literature, the Qur'an provides many descriptions of ideas (explanations) that textually examine the concept of physics.

Allah SWT created everything with its size. Creating and perfecting His creation determines the level (regularity) of each. Physics, as one of the sciences, tries to study and read these predetermined sizes and regularities. The language in expressing these sizes and regularities in physics is called the empirical

formula of physics [4]. Physics is a science that studies the essential components of the universe and its interactions [5].

Meanwhile, Physics is a science that studies natural phenomena (objects), both micro, macro, and their interactions also try to find relationships between these symptoms and reality. Physics is related to finding out about nature systematically so that the results of learning Physics are not only mastery of a collection of knowledge in the form of facts, concepts, principles but is a process of discovery [6]. Physics must be proven by concrete human reason through scientific performance. Furthermore, it must be tested for the truth to understand facts, concepts, and even theories. As long as a new theory cannot break the physical theory, then the theory is still considered the truth [3].

The relationship between Qur'an and physics can be proven with *Kauniyah* verses, which contain the greatness of the universe and all its contents. One of them is the letter of Ali Imran verse 190 which gives an implied meaning regarding natural phenomena that can be studied with physical theory [7]. All knowledge of the world has been written in the Qur'an either explicitly or implicitly. Therefore, the meaning and interpretation must be correct.

Based on the previous research findings, if the study of the verses of the Qur'an related to science is further improved, it will obtain the appropriate truth. If lessons in the world of education regarding the study of the Qur'an are added, then the student's love of the Qur'an will be embedded so that young people who have the morality of the Qur'an appear [8]. In addition, based on the results of interviews with students at MAN Purwodadi, it shows that many students think that science has nothing to do with religion (Al-Qur'an). They never study the Qur'an with the science they learn [9]. Therefore, it is crucial in studying physics in the Qur'an because earlier scientists also formulated the concept of physics-based on the Qur'an.

Based on the description above, the author intends to analyse research trends in the study of physics in the Qur'an using bibliometric analysis for the last five years (2016-2020), including (1) publication output, document sources, and language sources, (2) the distribution of publications across countries, (3) the top author in researching of physics study in the Qur'an in the world. (4) publication patterns based on source titles, (5) the contribution of Indonesian researchers on researching the study of physics in the Qur'an, and (6) the visualization results of the research trends of physics study in the Qur'an. Therefore, this study uses bibliometric analysis because it is very helpful for researchers to identify the research trends and impactful studies [10]. Bibliometric analysis is an appropriate method to evaluate the contribution of journals in the advancement of knowledge [11]. Journals are considered prominent channels of sharing the scientific and scholarly research to rest of the world. These channels of communication are receptive parameters of current and emerging trends in any area of knowledge [12]. *Bibliometric analysis* is a technique used to provide a network structure that refers to questions, such as the main topics in a particular field of science, how these topics relate to one another, and how a particular topic develops over time [13]. This study reviewed the research trends on physics studies in the Qur'an during 2016-2020 to identify the research trends and help researchers in future studies [14].

2. Research Method

This study uses a literature study method that applies bibliometric analysis by optimizing the Scopus Elsevier database, which is the most extensive collection of literature summaries globally, with citations that provide abstracts from various peer-reviewed scientific and research literature. "ABS (Qur'an)" and "physics" were used as the filter to search for titles, abstracts, and keywords from 2016 to 2020. While the search strategy was little:

ABS (Qur'an) AND physics AND LIMIT-TO (PUBYEAR, 2020) OR LIMIT-TO (PUBYEAR, 2019) OR LIMIT-TO (PUBYEAR, 2018) OR LIMIT-TO (PUBYEAR, 2017) OR LIMIT-TO (PUBYEAR, 2016)).

Data collection was carried out on April 12, 2021. Based on the search, 128 documents were obtained that matched the keywords. Then the data obtained is exported to CSV format so that all recorded information from each article is downloaded. The results obtained are then analysed using *VOSviewer* software to visualize and explore bibliometric knowledge maps [15].

3. Result and Discussion

Publication output, document sources, and language sources

Based on a search using the Scopus Elsevier database obtained 128 documents related to the study of physics in the Qur'an. The search is limited to the 2016-2020 period, and there are 5 document sources, namely book chapters, reviews, books, articles, and conference papers.

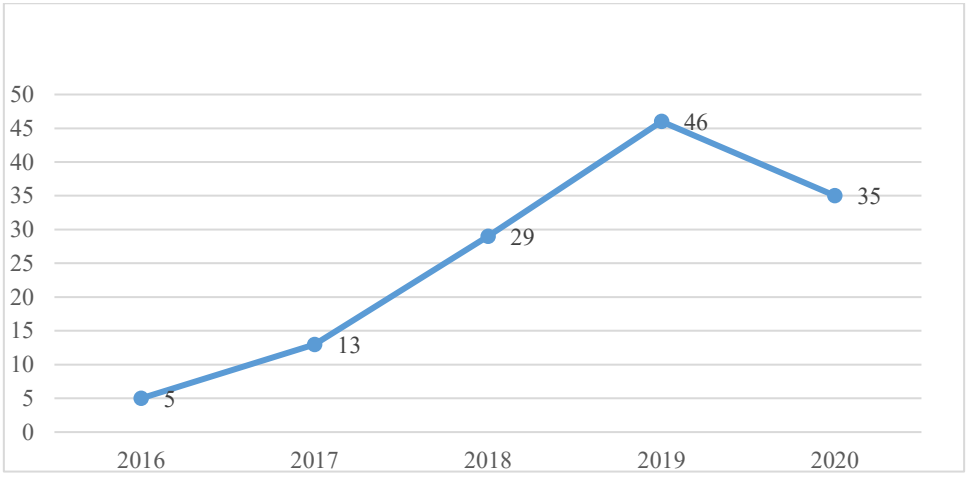

Figure 1. The number of documents on physics study in the Qur'an during 2016-2020

Based on Figure 1, the graph in 2016-2019 increased dramatically. In 2016 there were only five documents, and it became eight times that in 2019, namely 46 documents. After 2019 it decreased in 2020 with a difference of 11 documents.

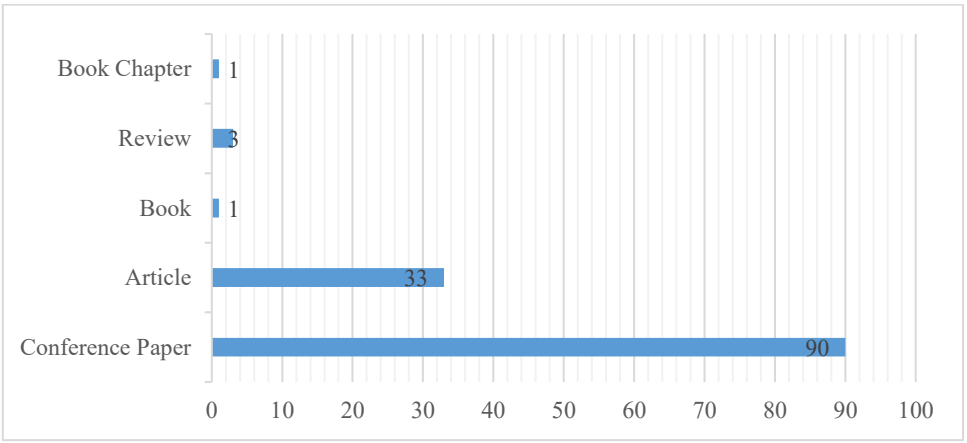

Figure 2. The number of documents on physics study in the Qur'an based on source

Figure 2 shows that the largest source of documents is conference papers, totalling 90 documents. Then followed by articles and reviews. In this case, it can be seen that the book and book chapter issued at least 1 document.

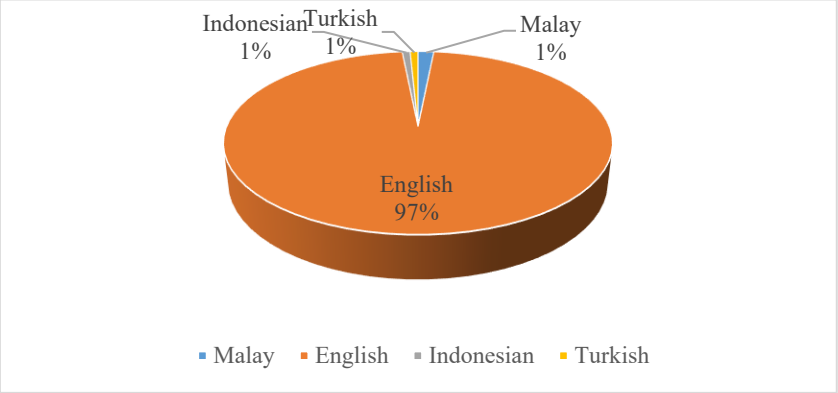

Figure 3. The percentages of documents on physics study in the Qur'an based on Language

Based on Figure 3, it can be seen that the research related to the study of physics in the Qur'an, which amounted to 128 documents, mostly used the English language, which was about 124 documents with a percentage of 97%. Other documents using the Malaysian language amounted to 2 documents with a percentage of 1%. Documents that use Indonesian and Turkish have the least amount of 1 document each with a percentage of 1%.

Countries distribution

Based on the number of cross-border documents shown in Figure 4, Indonesia dominates with 89 documents from 2016-2020. It was then continued with Malaysia. Other countries such as Egypt and Arab contributed 4 and 3 documents, respectively. Meanwhile, France, Italy, Iran, UK, Germany, Turkey, India, and Iraq contributed the same number of documents.

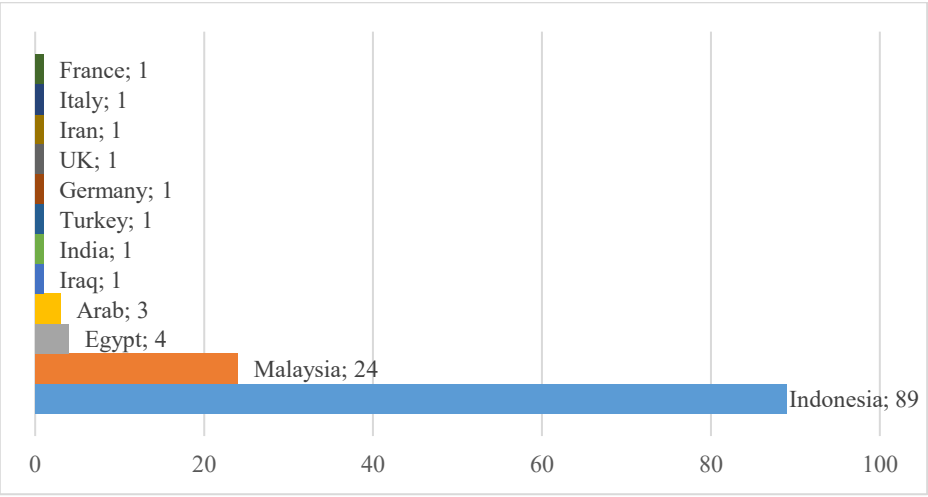

Figure 4. Countries distribution of physics study in the Qur'an during 2016-2020

Top authors in researching of physics studies in the Qur'an

The productivity of the top writers on physics studies in the Qur'an during 2016-2020 with the Scopus index is shown in Figure 5, where Adiwijaya is the most productive writer on this topic, with seven publications.

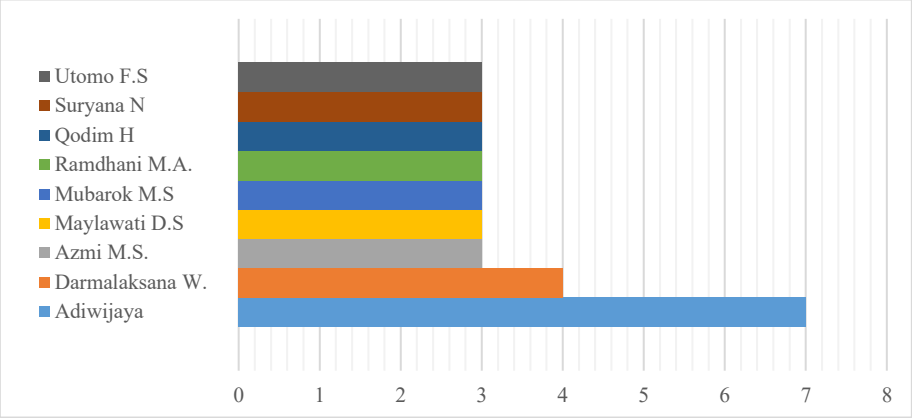

Figure 5. Top authors in researching of physics studies in the Qur'an (2016-2020)

The pattern of publication of the study of physics in the Qur'an based on the title of the source

Table 1 describes the journals or proceedings that contribute to the study of physics in the Qur'an in the world. The Journal of Physics Conference was the journal that contributed the most to the research, with 47 documents. This is in line with research conducted by (Suprapto et al., 2021b; 2021c), which stated that the Journal of Physics Conference was a series of leading conferences that contributed the most to the research [16-17]. Then IOP Conf. Ser. Earth Environ. Sci. ranks as the second-largest contributor to the research. While IOP Conf. Ser. Mater. Sci. Eng. ranks third in publishing as many as 14 documents.

Table 1. Number of documents of physics study in the Qur'an (2016-2020) across source tittle.

No	Name of Journal or Proceeding	Number of documents
1	J. Phys. Conf. Ser.	47
2	IOP Conf. Ser. Earth Environ. Sci.	15
3	IOP Conf. Ser. Mater. Sci. Eng.	14
4	AIP Conf. Proc.	4
5	Intl. J. Adv. Comput. Sci. Appl.	3
6	Indones. J. Electrical Eng. Comput. Sci.	2
7	Opcion	2
8	Sains Malays.	2
9	Telkomnika Telecomun. Compt. Electr. Control	2
10-42	32 others journal and proceeding (with 1 document)	1

The contribution of Indonesian Researches on physics study in the Qur'an

Table 2 shows the top universities in Indonesia that contribute to the study of physics in the Qur'an. Public universities dominate the top thirteen universities in Indonesia as many as nine universities. Meanwhile, there are only 4 Islamic universities/institutions. However, in this case, UIN Sunan Gunung Djati Bandung ranks first as the most published university with 14 documents. Higher education rankings tend to be a more subjective popularity race where these factors do not always indicate the quality of a university. For example, the number of publications does not necessarily match the quality or usefulness of the article. Therefore, quality improvement based on ranking cannot be seen from the number of publications, but by upholding the principles of openness, completeness, fairness, and accommodation for the diversity of universities in Indonesia [18].

Table 2. Top universities/institutions in the physics study in the Qur'an in Indonesia (2016-2020).

No.	University	Number of documents
1	UIN Sunan Gunung Djati Bandung	14
2	Universitas Telkom	11
3	Universitas Sumatera Utara	4
4	Universitas Amikom	3
5	Universitas Brawijaya	3
6	Universitas Pendidikan Indonesia	3
7	IAIN Kendari	3
8	UIN Syarif Hidayatullah	2
9	UIN Maulana Malik Ibrahim	2
10	Universitas Sebelas Maret	2
11	Universitas Darussalam Gontor	2
12	UIN Raden Intan Lampung	2
13	Universitas Negeri Semarang	2

Figure 5 shows the top Indonesian writers who contributed to the study of physics in the Qur'an. While picture 6 shows their collaboration. It was stated that Adiwijaya, Darmalaksana, Maylawati, Qodim, Azmi, Suryana, Utomo, Mubarok, and Ramdhani were the most prolific writers in this research in 2016-2020. In this case, Adiwijaya ranks first with seven documents.

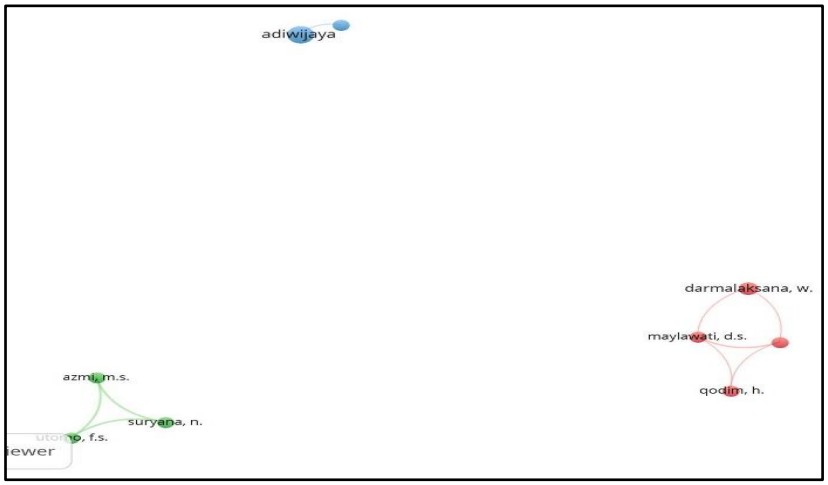

Figure 6. Collaboration of top Indonesian authors on research of physics studies in the Qur'an (2016-2020)

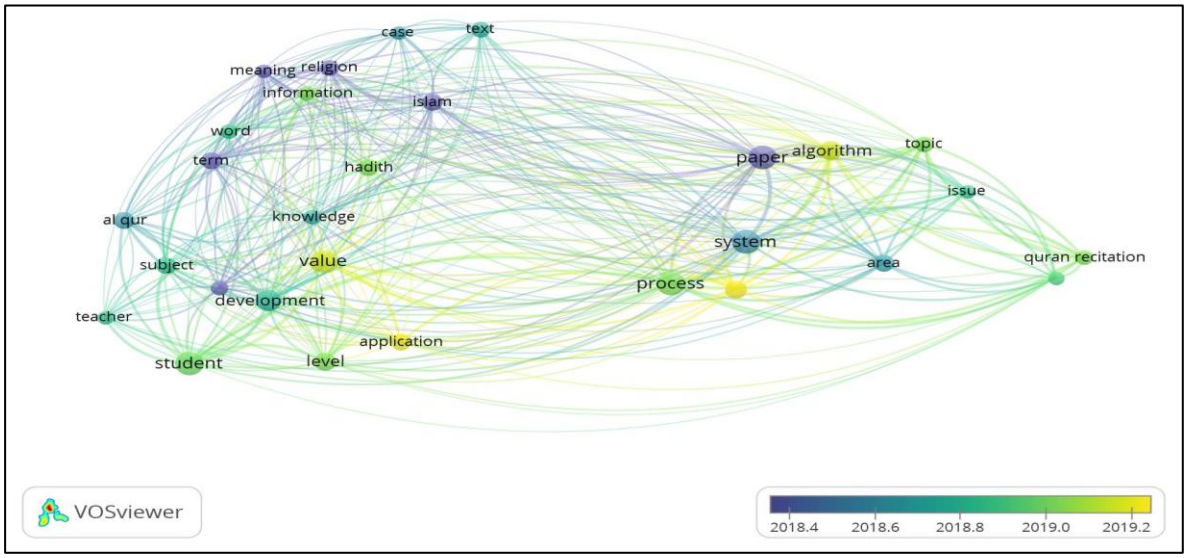

Figure 7. Visualization of physics study research in the Qur'an (2016-2020)

Visualization of research trends on physics study in the Qur'an

A total of 128 documents related to physics studies in the Scopus indexed Qur'an were visualised through the *VoSViewer* software that was useful to find the novelty of the research, the relevance of the topic, and the influence of the research results.

Figure 7 shows a visualization of research on the study of physics in the Qur'an 2016-2020. Researchers in the world produced two clusters. Cluster 1 in green consists of text, cases, understanding, religion, information, Islam, words, terms, hadith, Al-Qur'an, knowledge, subjects, development, values, teachers, students, levels, and applications. While the red cluster 2 consists of topics, algorithms, papers, issues, systems, processes, areas, case studies, implementation, and Qur'an recitation.

Figure 8 shows the relationship between the Qur'an and the teacher where there is a system and process when the teacher teaches it to students to gain knowledge. In addition, there is development and application. In the current era, teachers are required to maximize existing applications related to learning related to the Qur'an.

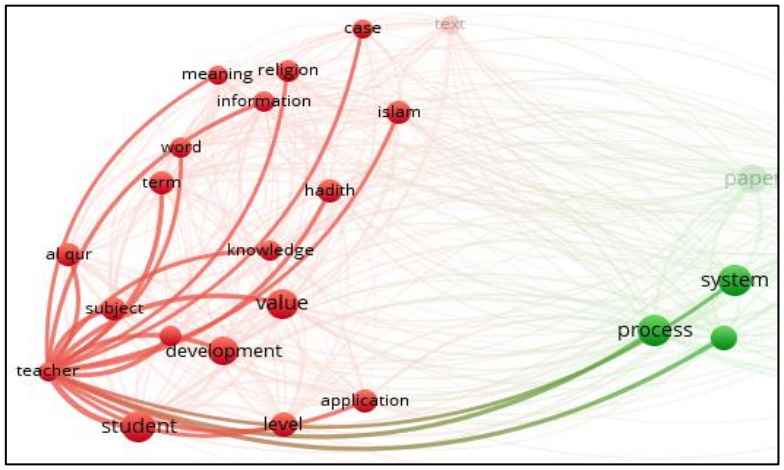

Figure 8. Teacher as the central variable on physics studies of the Qur'an

While Figure 9 shows the relationship between the Qur'an and students where there is a case study. In learning, the teacher usually provides case studies to understand the material provided more efficiently. In addition, the same as Figure 8, there is development and application.

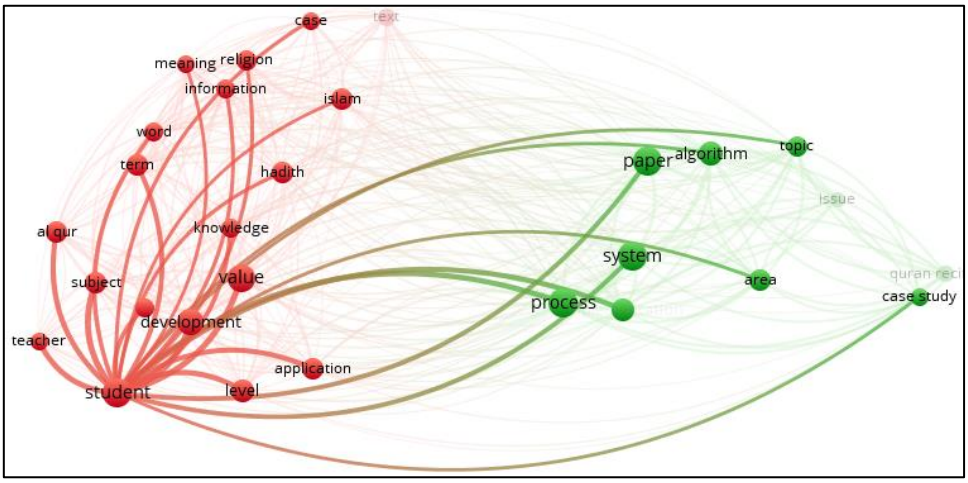

Figure 9. Student as the central variable on physics studies of the Qur'an

4. Conclusion

Several essential points related to research trends in physics studies in the Qur'an in 2016-2020 have been analysed using bibliometrics. The number of publications in 2016-2019 increased dramatically. However, after 2019 there was a decline in 2020. Conference papers dominated the document sources related to this topic by mostly using English. Indonesia is the first country to publish the most research on this topic, where Adiwijaya is the most prolific writer from Indonesia who publishes seven documents. The Journal of Physics Conference was the journal that contributed the most to the research, with 47 documents. Most Indonesian universities researching physics studies in the Qur'an are UIN Sunan Gunung Djati Bandung. However, the most dominating research in this research comes from public universities, while Islamic universities only number 4. Visualization of research trends in physics studies in the Qur'an in 2016-2020 there is two clusters of which are: (1) sources of information on physics studies in the Qur'an and (2) implementation of the study of physics in the Qur'an. The results of this study can help related researchers recognize research trends in the study of physics in the Qur'an in the world and provide direction for further research.

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LETTER OF ACCEPTANCE

Dear **Alisa Arrizkiyah**
Selsy Florensia Alfany
Nadi Suprapto
Utama Alan Deta

It is our pleasure to inform you that your manuscript entitled:

"Research Trend on Physics Studies in the Qur'an Through Bibliometric Analysis During 2016-2020" (2879)

is accepted to be presented at MISEIC 2021. Thank you for your participation.

Your Sincerely,

Beni Setiawan, Ph.D
MISEIC 2021 Chairperson

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ANALISIS BIBLIOMETRIK DALAM PENDIDIKAN

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Analisis Bibliometrik Dalam Pendidikan 2021

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PRAKATA

Buku ini ditulis sebagai bagian dari luaran tambahan penelitian dasar yang berjudul: "**Reorientasi Riset Pendidikan Fisika di Indonesia Berdasarkan Hasil Pemetaan Tren Riset Berbasis Database Scopus dan Web of science dengan Bibliometric Analysis**". Pembiayaan penulisan buku ini diperoleh dari Direktorat Sumber Daya, Kemdikbudristek melalui skema Penelitian Dasar tahun 2021 dengan nomor kontrak 133/SP2H/LT/DRPM/2021 dan nomor SPK B/12084/UN38.9/LK.04.00/2021.

Secara umum buku ini berisi informasi dasar terkait analisis bibliometrik, berbagai software dan sarana pendukung, dan contoh artikel ilmiah yang memanfaatkan analisis bibliometric untuk bidang Pendidikan Fisika maupun Pendidikan Sains secara umum.

Buku ini menjadi sangat penting untuk dibaca mengingat pada masa pandemi ataupun era kenormalan (*new normal*) baru ini riset menggunakan sumber *digital library* sangat penting. Untuk itu pengetahuan akan *library research* termasuk di dalamnya *bibliometric analysis* menjadi sebuah keharusan dan sangat disarankan oleh penulis.

Ibarat tiada gading yang tak retak, buku ini tentunya masih jauh dari kata sempurna, untuk itu berbagai masukan, kritik, dan saran dengan senang hati diterima oleh para penulis. Akhirnya, silahkan membaca dan menikmati buku ini.

Surabaya, September 2021

Penulis

DAFTAR ISI

Bagian Pertama*

Memahami Bibliometrik

> "Seperti energi nuklir, faktor dampaknya memiliki beragam kekurangan dan kelebihan. Saya berharap hal tersebut digunakan secara konstruktif sekaligus menyadari bahwa di tangan yang salah hal itu mungkin dapat disalahgunakan."[1]
>
> - Eugene Garfield, "*Journal Impact Factor: A Brief Review*"

Bagi banyak peneliti yang ingin menunjukkan dampaknya kepada audiens tradisional fakultas dan administrator, bibliometrik adalah bagian percakapan yang tak terhindarkan dan tujuan yang harus mereka perjuangkan atau rintangan yang harus mereka lompati. Tapi apa sebenarnya bibliometrik itu, dan bagaimana bibliometrik mendominasi pengertian modern kita tentang apa yang membuat penelitian disebut "berdampak"? Dalam bab ini, kita mempelajari asal-usul bibliometrik abad ke-20 sebelum melanjutkan ke diskusi yang lebih rinci tentang keadaan saat ini, termasuk kategori utama metrik, alat bibliometrik populer, dan praktik bibliometrik dari peneliti abad ke 21 dan pustakawan.

Definisi Bibliometrik

Hal pertama yang perlu diketahui tentang bidang bibliometrik adalah bahwa asal-usulnya terletak tepat di dunia cetak. Sementara bibliometrik diciptakan sebagai istilah pada akhir 1960-an oleh Alan Pritchard sebagai "penerapan matematika dan metode statistik untuk buku dan media komunikasi lainnya,"[2] gagasan bibliometrik

**[disadur dari Ch. 3 Understanding Bibliometric, buku "Meaningful METRICS: A 21st-Century Librarian's Guide to Bibliometrics, Altmetrics, and Research Impact", karya R. C. Roemer & R. Borchardt (2015).*

SURAT KETERANGAN PENERBITAN BUKU

Penerbit Kun Fayakun sebagai anggota IKAPI telah menerbitkan buku dengan judul: "Analisis Bibliometrik dalam Pendidikan 2021", dengan ISBN: 9786233435604, dengan tim penulis: Nadi Suprapto, Ph.D; Dr. Binar Kurnia Prahani, M.Pd.; dan Utama Alan Deta, M.Si.

Untuk Periode pertama penerbit dan penulis bersepakat untuk mencetak sejumlah 20 eksemplar.

Pada halaman selanjutnya kami lampirkan sertifikat kepada penulis utama dan pertama.

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KEPUTUSAN REKTOR UNIVERSITAS NEGERI SURABAYA
NOMOR 407/UN38/HK/PP/2021

TENTANG

PENETAPAN PENERIMA PENELITIAN TAHUN JAMAK PENELITIAN DASAR DAN PEMBINAAN/KAPASITAS DANA DRPM TAHUN 2021

REKTOR UNIVERSITAS NEGERI SURABAYA,

Menimbang :

a. bahwa berdasarkan hasil seleksi desk evaluasi dan pemaparan proposal penelitian yang dilakukan oleh panitia seleksi, telah ditetapkan penerima Penelitian Tahun Jamak Penelitian Dasar Dan Pembinaan/Kapasitas Dana DRPM Tahun Anggaran 2021;
b. bahwa berdasarkan pertimbangan sebagaimana dimaksud dalam huruf a, perlu menetapkan Keputusan Rektor Universitas Negeri Surabaya Tentang Penetapan Penerima Penelitian Tahun Jamak Penelitian Dasar Dan Pembinaan/Kapasitas Dana DRPM Tahun 2021;

Mengingat :

1. Peraturan Pemerintah Republik Indonesia Nomor 37 Tahun 2009 tentang Dosen (Lembaran Negara Republik Indonesia Tahun 2009 Nomor 76, Tambahan Lembaran Negara Republik Indonesia Nomor 5007);
2. Peraturan Pemerintah RI Nomor 4 Tahun 2014 tentang Penyelenggaraan Pendidikan Tinggi dan Pengelolaan Perguruan Tinggi (Lembaran Negara Republik Indonesia Tahun 2014 Nomor 16, Tambahan Lembaran Negara Republik Indonesia Nomor 5500);
3. Peraturan Menteri Keuangan RI Nomor 92/PMK.05/2011 tentang Rencana Bisnis dan Anggaran Serta Pelaksanaan Anggaran Badan Layanan Umum (Berita Negara Republik Indonesia Tahun 2011 Nomor 363);
4. Peraturan Menteri Riset, Teknologi dan Pendidikan Tinggi RI Nomor 15 Tahun 2016 tentang Organisasi dan Tata Kerja Universitas Negeri Surabaya (Berita Negara Republik Indonesia Tahun 2015 Nomor 889);
5. Peraturan Menteri Riset, Teknologi dan Pendidikan Tinggi RI Nomor 79 Tahun 2017 tentang Statuta Universitas Negeri Surabaya (Berita Negara Republik Indonesia Tahun 2017 Nomor 1858);

6. Keputusan Menteri Keuangan RI Nomor 50/KMK.05/2009 tentang Penetapan Universitas Negeri Surabaya Pada Departemen Pendidikan Nasional sebagai Instansi Pemerintah yang menerapkan Pengelolaan Keuangan Badan Layanan Umum;
7. Keputusan Menteri Riset, Teknologi dan Pendidikan Tinggi RI Nomor 461/M/KPT.KP/2018 tentang Pemberhentian dan Pengangkatan Rektor Universitas Negeri Surabaya Periode Tahun 2018-2022;

MEMUTUSKAN :

Menetapkan : KEPUTUSAN REKTOR UNIVERSITAS NEGERI SURABAYA TENTANG PENETAPAN PENERIMA PENELITIAN TAHUN JAMAK PENELITIAN DASAR DAN PEMBINAAN/KAPASITAS DANA DRPM TAHUN 2021.

KESATU : Menetapkan Penerima Penelitian Tahun Jamak Penelitian Dasar Dan Pembinaan/Kapasitas Dana DRPM Tahun 2021, sebagaimana tercantum dalam Lampiran yang merupakan bagian tidak terpisahkan dari Keputusan Rektor ini.

KEDUA : Dalam melaksanakan tugasnya sebagai Penerima Penelitian Tahun Jamak Penelitian Dasar Dan Pembinaan/Kapasitas Dana DRPM Tahun 2021, wajib berpedoman pada ketentuan yang berlaku, dan secara tertulis memberikan laporan kepada Rektor Universitas Negeri Surabaya.

KETIGA : Keputusan Rektor ini mulai berlaku sejak tanggal ditetapkan sampai dengan tanggal 31 Desember 2021.

Ditetapkan di Surabaya
pada tanggal 18 Maret 2021
REKTOR UNIVERSITAS NEGERI SURABAYA,

ttd

NURHASAN
NIP 196304291990021001

Salinan sesuai dengan aslinya.
Kepala Biro Umum dan Keuangan,

SULAKSONO
NIP 196504091987011001

LAMPIRAN
KEPUTUSAN REKTOR UNIVERSITAS NEGERI SURABAYA
NOMOR 407/UN38/HK/PP/2021
TENTANG
PENETAPAN PENERIMA PENELITIAN TAHUN JAMAK PENELITIAN DASAR DAN PEMBINAAN/KAPASITAS DANA DRPM TAHUN 2021

DAFTAR PENERIMA PENELITIAN TAHUN JAMAK PENELITIAN DASAR DAN PEMBINAAN/KAPASITAS TAHUN ANGGARAN 2021
DANA DRPM TAHUN 2021

No.	Fakultas	Jurusan	Program Studi	Judul	Tim Peneliti	NIDN	Gol.	Pend.	L/P	Waktu (bln)	Dana yg disetujui (Rp.)	Termin I (100%) (Rp.)	No. Rekening	Skema
1	FMIPA	Matematika	Pendidikan Matematika	Numerasi Mahasiswa Calon Guru Sekolah Dasar Ditinjau Dari Self Efficacy	Prof. Dr. Tatag Yuli Eko Siswono, S.Pd., M.Pd. Dr. Abadi, M.Sc. Via Yustitia, S.Pd., M.Pd.	0008077106 0030086501 0616019101	IV/b IV/a -	S-3 S-3 S-2	L L P	18 Mart - 16 Nov 2021	36.000.000	36.000.000	00377-01-58-000001-6	Penelitian Disertasi Doktor
2	FMIPA	Kimia	Pendidikan Sains	Nano-Teknologi Ekstrak Yeast-Beras Hitam Sebagai Anti Diabetes Mellitus Tipe 2 (Gangguan Penyerta Covid-19)	Prof. Dr. Rudiana Agustini, M.Pd. Dr. Nuniek Herdyastuti, M.Si. Dr. I Gusti Made Sanjaya, M.Si.	0010086008 0010117004 0004126505	IV/d IV/b IV/c	S-3 S-3 S-3	P P L	18 Mart - 16 Nov 2021	212.380.000	212.380.000	00377-01-58-000504-0	Penelitian Dasar Unggulan Perguruan Tinggi
3	FMIPA	Kimia	Pendidikan Sains	Mencari Komposisi Optimum Ekstrak Kayu Secang (Caesalpinia Sappan L) dan Jahe Merah (Zingiber Ofinale Roxb.) Yang Efektif Sebagai Agen Anti-Arthritis	Prof. Dr. Tukiran, M.Si. Prof. Dr. Suyatno, M.Si. Fauzia Indah Sabila	0028126604 0020076504 -	IV/d IV/d -	S-3 S-3 -	L L P	18 Mart - 16 Nov 2021	120.865.000	120.865.000	00377-01-58-000394-1	Penelitian Dasar Unggulan Perguruan Tinggi
4	FMIPA	Fisika	Pendidikan Fisika	Reorientasi Riset Pendidikan Fisika di Indonesia Berdasarkan Hasil Pemetaan Tren Riset Berbasis Database Scopus dan Web of science dengan Bibliometric Analysis	Nadi Suprapto, S.Pd., M.Pd., Ph.D. Dr. Binar Kurnia Prahani, S.Pd., M.Pd. Utama Alan Deta, S.Pd., M.Pd., M.Si.	0012068102 0013059004 0017038901	III/d III/c III/b	S-3 S-3 S-2	L L L	18 Mart - 16 Nov 2021	86.440.000	86.440.000	00377-01-58-000224-6	Penelitian Dasar
5	FBS	Bahasa dan Sastra Indonesia	Pendidikan Bahasa dan Sastra Indonesia	Psikologi Lokal Masyarakat Jawa dalam Sastra Indonesia di Jawa Timur Konteks Pengarang, Karya, dan Respon Pembaca Perspektif Indigenous Studies: Konkretisasi Promosi dan Penguatan Kearifan Lokal Melalui Sastra	Dr. Anas Ahmadi, S.Pd., M.Pd. Prof. Dr. Darni, M.Hum. Prof. Dr. Bambang Yulianto, M.Pd.	0011058005 0026096502 0005076009	III/d IV/d IV/e	S-3 S-3 S-3	L P L	18 Mart - 16 Nov 2021	101.535.000	101.535.000	00377-01-58-001403-1	Penelitian Dasar Unggulan Perguruan Tinggi
6	FMIPA	Matematika	Matematika	Optimasi Kognitif, Afektif dan Konatif Berbasis Analisis EEG untuk Meningkatkan Performa Mahasiswa Matematika sebagai Pribadi yang Utuh	Prof. Dr. Dwi Juniati, M.Si. Prof. Drs. I Ketut Budayasa, Ph.D.	0015066704 0004125703	IV/e IV/e	S-3 S-3	P L	18 Mart - 16 Nov 2021	267.920.000	267.920.000	00377-01-58-000436-1	Penelitian Dasar
Grand Total											**825.140.000**	**825.140.000**		

Salinan sesuai dengan aslinya.
Kepala Biro Umum dan Keuangan,

SULAKSONO
NIP 196504091987011001

Ditetapkan di : Surabaya
Pada tanggal : 18 Maret 2021
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