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Global Trend of Science Edutainment Research in The Last Ten Years

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Abstract

Science edutainment study trend is increasing every year. Science edutainment makes learning more interesting and interactive for student. The increasing number of science edutainment studies requires efforts to understand the patterns, novelties, research trends, and the potential areas of research in the future. This research was conducted on December 23, 2022. This study aims to analyze research trends, document types, document sources, most productive researchers, most used languages on documents, most contributing countries and affiliations, and also a visualization map of research trends over the past ten years. This bibliometric research and literature review uses metadata from Scopus database and mapping visualization of bibliometric by VOSviewer programs. Bibliometric results show that research trends of science edutainment tend to increase over the last ten years from 2013 to 2022. The most widely available document types are article types and document sources are available in journal types. The region that produces the most documents is the United States while Indonesia is one of the regions producing science edutainment documents in eighth. The affiliation institution that produces the most documents is Universiti Utara Malaysia. While the top prolific author is Naoyuki Kubota from Department of Mechanical Systems Engineering, Tokyo Metropolitan University, Tokyo, Japan. There are six clusters by the visualization of VOSviewer software focus on keyword that are students, social media, virtual reality, internet, effectiveness, and digital tools. Meanwhile, the opportunity and potential for future researchers to conduct science edutainment research are keywords that are few found, such as physics, ICT (Information, Communication, Technology), and learning models.

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Introduction

Science subjects are still known as a difficult subject in student view. Students have difficulties in understanding some science concepts (Prabha, 2020). The main factor for student difficulties is complex mathematical formulas and calculations. In addition, abstract concepts also support students' dislikes and misconceptions about science. This causes low student scores in science subjects. An appropriate analogy is needed to assist students in representing or concretizing something abstract (Suseno, 2014).

Teachers must recognize and overcome student difficulties and familiarize themselves with students' perspectives in understanding science concepts. Students' views and ideas about their difficulties should be respected. Teaching-learning approaches and strategies must be adapted to the learning needs and learning styles of students (Prabha, 2020). Teachers must

have creativity in teaching science to students. One way that can be used by teachers to teach science is by applying science edutainment.

Edutainment consists of two words, namely education and entertainment. Edutainment is defined as fun education. Edutainment is a learning process that is designed to harmoniously combine educational and entertainment content so that learning activities are enjoyable. Edutainment teaches social interaction to students by incorporating various lessons in forms of entertainment that are familiar to them, such as television shows, games on computers or video games, movies, music, websites, multimedia devices, and so on (Shodiqin, 2016). Game-based learning environments are a valuable analysis for student assessment and learning support using existing or emerging empirical research methodologies from a variety of fields, including computer science, software engineering, educational data mining, learning analytics, learning science, statistics, and information visualization (Kim et al., 2022).

Entertainment assumes a farther, more complex and more intensive (non-hedonic) form of entertainment experience, which can be characterized by the term "appreciation" (Niemann et al., 2020). Practicum in science can be analogized as an experience for students in understanding science through practice to prove theory. Some practicums can also be entertainment for students because studying science is not only theoretical but also through direct proof. However, the teacher must pay attention to the scientific background of students because not all students have sufficient basic science (Noor et al., 2020).

Science edutainment is an umbrella term that describes a variety of approaches that combine education and entertainment. In the pedagogical literature, the term usually refers to a form of education that seeks to captivate, instill joy and evoke emotion. It seems clear that entertainment does not only consist of emotions such as joy or happiness, but also has an "emotional component" (Niemann et al., 2020).

Science edutainment is an entertaining and fun science learning that involves elements of science, inquiry and educational games. Science edutainment includes fun science learning using computer-based animation media as well as practicum to discover the concept of subject matter and educational games using animation media. Based on the research results, the application of science edutainment learning can improve student learning outcomes (D. Indriati S.C.P, 2012).

There are four things that characterize the edutainment concept. First, the concept of edutainment is a series of approaches to learning to link the teaching and learning processes. Second, the edutainment concept strives for learning to take place in a conducive and enjoyable atmosphere. Third, the edutainment concept offers a learning system that is designed with an efficient relationship, including students, teachers, the learning process, and the learning environment. Fourth, the edutainment concept learning process and activities do not appear in a frightening face, but in a humanist form (Shodiqin, 2016).

There are many studies on science edutainment that are currently developing. If you want to research science edutainment, you should know the research trends that have been done before. Thus, we can seek novelty from science edutainment research. We can know novelty through Bibliometric research. Bibliometric analysis is a popular and rigorous method for exploring and analyzing large amounts of scientific data (Donthu et al., 2021). The popularity of bibliometrics is related to the availability and accessibility of bibliometric software such as

Gephi, Leximancer, VOSviewer, and scientific databases such as Scopus and Web of Science. Web of Science (WoS) and Scopus are the two main bibliographic database (Pranckutė, 2021).

This study aims to analyze trends in science edutainment research using the Scopus database and visualized using VOSviewer. Science edutainment research has an important role in teaching interesting and fun science for students. However, science edutainment research has been carried out by many previous researchers. Therefore, this bibliometric research seeks to find the most novelty possibilities of science edutainment research to be carried out in the future. It is hoped that future researchers will be able to find out trends in science edutainment research and opportunities to conduct similar research.

Method

Type of the research is a descriptive study using bibliometric analysis (Donthu et al., 2021; Noor & Prasetyo, 2022; Suprapto et al., 2021). Bibliometric research aims to measure the development of scientific article publications and scientific contributions (Hidaayatullaah et al., 2021). This study uses Scopus database (www.scopus.com). Scopus is a database of abstracts and citations (Salisbury, 2009). This research was conducted on December 23, 2022. The research procedure is described in Figure 1.

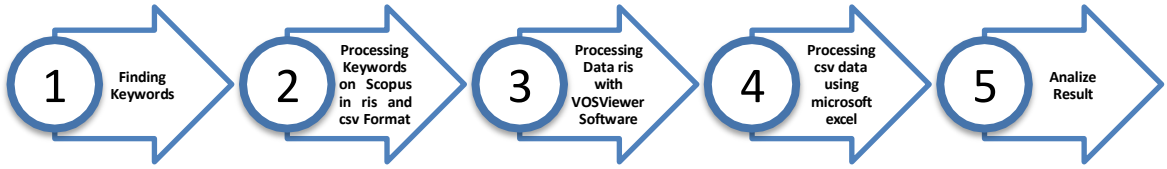


Figure 1. Research Steps of Bibliometric Study

(Khoir et al., 2022)

Scopus metadata-based research produced 4,914 document results during the 2013-2022 years period. Scopus only provides the metadata for the first 2000 documents downloaded. The database is downloaded in ris and csv format. This study uses data by filtering several documents through advanced searches with the keywords is science and edutainment. Metadata in ris format is analyzed and processed by using the VOSviewer software, while metadata in csv format is analyzed and processed by using Microsoft Excel. This software provides clusterization of closely related elements and graphical visualization of bibliometric features such as document type, countries, and affiliation (Cascella et al., 2022).

While the search strategy was:

science AND edutainment AND (LIMIT-TO (PUBYEAR , 2022) OR LIMIT-TO (PUBYEAR , 2021) OR 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))

Results and Discussion

Research Results Document on Science Edutainment during 2013-2022

The distribution of the documents on science edutainment has increased during 2013 to 2022. The science edutainment approach is science learning that is entertaining and fun which involves elements of science, the process of discovery (inquiry) and educational games. The science edutainment approach includes science learning in which the learning process does not use formulas and practicum to discover concepts from subject matter in the form of educational games (Taufiq et al., 2014). A graph of document distribution in every year can be seen in Figure 2 and the data visualization using the VOSviewer software can be seen in Figure 3.

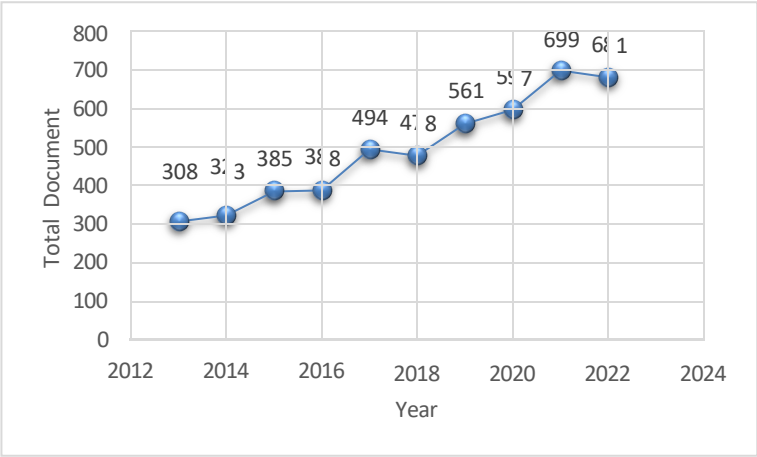


Figure 2. Distribution of Science Edutainment Research Trends Documents

The graph in figure 2. shows the trend of research on science edutainment is increasing every year. In 2018 and 2022 the research trend has decreased but not significantly. In 2017 and 2021, document distribution experienced the most significant trend of improvement. In general, the research trend still seems to be increasing every year.

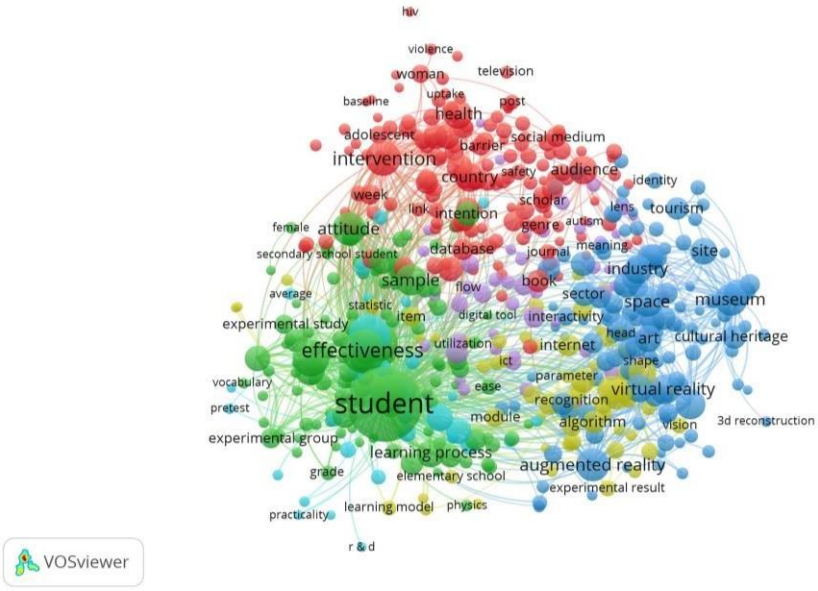


Figure 3. Network Visualisation of Science Edutainment from VOSviewer Software

Figure 3 is a network visualization of the relationship between terms or keywords that are still related to science edutainment research. Based on the color shows in Figure 3, there are six clusters that related to science edutainment focus on discussing students (green), social media (red), virtual reality (blue), internet (yellow), effectiveness (light blue), and digital tools (purple). There is no term or keyword that explicitly states science edutainment in network visualization. However, each word that appears in network visualization represents a keyword that is often used in research related to science edutainment. Meanwhile, the opportunity and potential for future researchers to conduct science edutainment research are keywords that are few found, such as physics, ICT (Information, Communication, Technology), learning models.

Physics is a science subject that can develop students' analytical, inductive and deductive thinking skills. In addition, learning physics can develop problem solving related to the natural surroundings and develop students' knowledge and skills. Physics learning can be associated with edutainment which is an entertaining and fun physics lesson that involves several elements such as science, the process of discovery (inquiry) and educational games. The physics edutainment learning includes (1) fun physics learning, (2) practicum to discover the concept of subject matter, and (3) educational games. The concept of implementing Physics Edutainment learning is supported by presenting ICT-based media, including PhET Simulation. PhET, which stands for Physics Education and Technology, is a site that provides physics simulations that can be downloaded for free to be used in learning (Ananda et al., 2021).

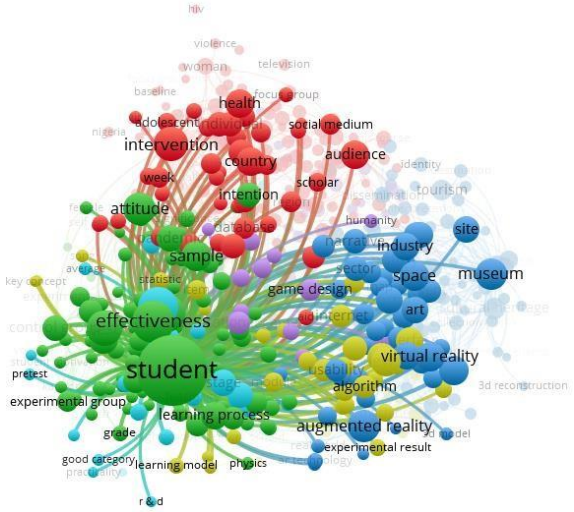
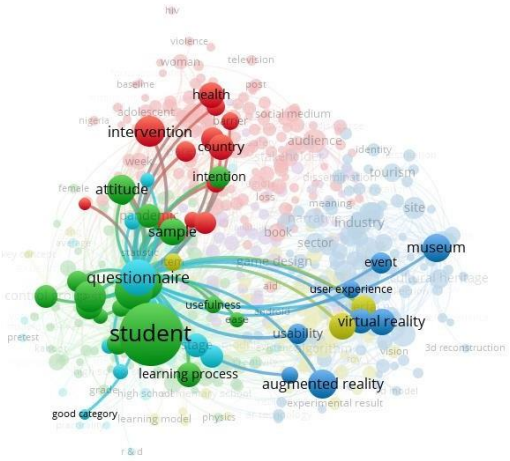


Figure 4. The Dominant Term in The Visualization Outcomes of Science Edutainment

Student is the dominant term in the visualisation of VOSviewer software. It means that Science Edutainment is very close in learning process with the student as the centre of learning. The other term related with student are learning process, virtual reality, game design, social medium, physics, R&D, and so on. There are many terms relate with student as a central of learning. It shows that the teacher must be creative if they want to teach student with science edutainment learning model. Teachers can creatively develop lesson plans in the form of Subject Specific Pedagogy (SSP). The design of science learning into SSP is proven to be able to improve students' science process skills through student centre-based learning (Noor & Wilujeng, 2015).

Student Centre Learning is a learning approach that provides a reference for involving students in learning activities. This model provides an opportunity for children to recognize their potential and be able to explore and discover the knowledge they have. Learning based on Student Centre Learning has a good effect on the development and improvement of student learning outcomes (Andiwatir et al., 2021).



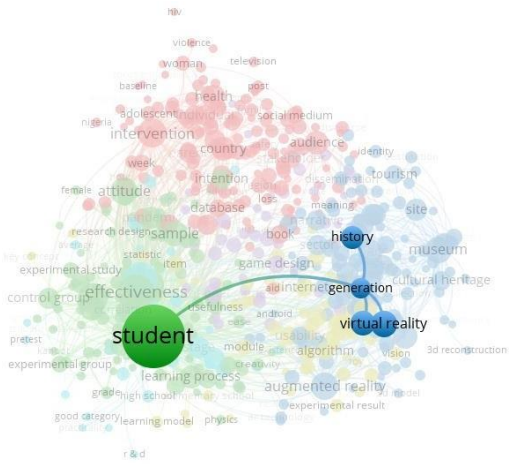


Figure 5. (a) **Figure 5.** (b)

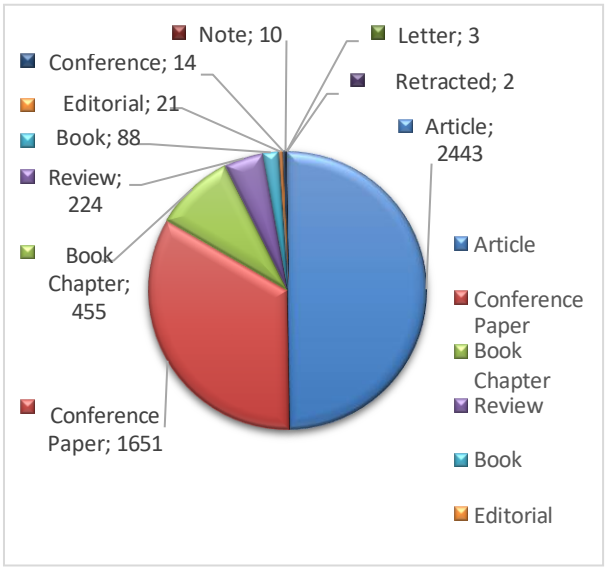
Figure 5. (a) Network Visualisation in Term of Questionnaire in Science Edutainment, and **Figure 5.** (b) Network Visualisation in Term of Generation in Science Edutainment

Figure 5.a. shows the research on science edutainment using questionnaire as a research instrument. Terms related to the questionnaire include student, learning process, sample, country, virtual reality, and so on. This shows that research on science edutainment uses quantitative research methods. Quantitative research emphasizes testing theory through measuring research variables with numbers and conducting analysis data with statistical procedures. This study uses deductive method that aims to test hypotheses. Quantitative research also use traditional, experimental or paradigms empirical (Paramita et al., 2021).

In Figure 5.b. focused on term generation. The terms related to generation include history, virtual reality, and student. This shows that science edutainment learning has a history of learning, especially for students using virtual reality. It is important to continue the trend of research on science edutainment so that science learning becomes more creative and innovative. Virtual Reality is a technology that uses computers or other electronic technologies to produce three-dimensional output to create a virtual world. The use of virtual reality in education was initially carried out with the help of computers. Technology provides a new nuance in the presentation of information, especially information in learning (Fardani, 2020).

Science Edutainment Research Distribution by Document Types and Document Source

Document review is a means of supporting researchers in collecting data or information. Documents as a source of data are widely used by researchers, especially for interpreting and even for predicting. Researchers can get to know the culture and values of research objects by studying these documents (Nilamsari, 2014). The most publication of Science Edutainment research based on document types and document source can be seen in Figure 6.a. dan 6.b.



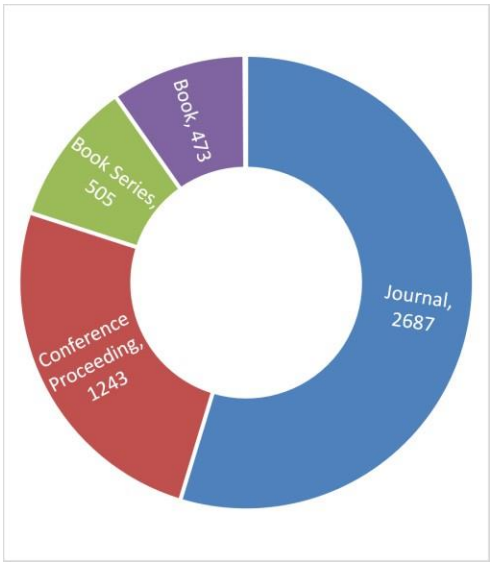


Figure 6. (a) **Figure 6.** (b)

Figure 6. (a) Science Edutainment Research Distribution by Document Types, and **Figure 6.** (b) Science Edutainment Research Distribution by Document Sources

Figure 6.a. visualize the most common type of document, namely articles with a total of 2,443 documents. In second place are conference papers with a total of 1,651 documents. This is in line with the data shown in the most document sources, namely journals with a total of 2,687 documents, followed by conference proceedings with a total of 1,243 documents. If we observe at this time, the development of journals is very rapid. This is because the system used in journal management has been carried out online which is called the Open Journal System (OJS). The Open Journal System (OJS) is a popular application tool used by many agencies to manage journals online. One of the reasons for the popularity of OJS is because it is open source or free. In addition, OJS also has features that are capable enough to handle online publications and are linked to various search engines, making it easier to identify and search for articles. OJS is equipped with various features that support publishing management, online editing management, user management at various user levels, a simple and user-friendly interface, as well as features for reading journals online. In addition, OJS is also supported and integrated with other PKP products, such as OCS (Open Conference System), OMS (Open Monograph Press) and OHS (Open Harvest System) (Arief & Handoko, 2016). The development of new journals that have appeared has added many choices for authors to publish the results of their research work. Thus, the number of documents produced in the article type is increasing. The quality of articles has also increased because there are reviewers and editors who maintain the quality of documents published on OJS.

The number of increases also occurred significantly in the conference proceedings. Conference activities are often carried out by institutions either online or offline at the national and international levels. The results of these activities are in the form of proceedings which are published online. Information technology makes it easy to hold online conferences even at the international level. Publication is also made easy because it can be done online. This has a positive impact on the development of science. Conferences that are increasing massively have caused the conference paper population to grow rapidly both in quantity and quality.

Science Edutainment Research Distribution by Region

The Region that produces the most articles on science edutainment is United States with 751 documents. Indonesia is in eighth place with a total of 210 documents. The list of countries along with the number of documents produced can be seen in Figure 7.a. Meanwhile, the visualization of country maps that contributed to producing science edutainment documents can be seen in Figure 7.b.

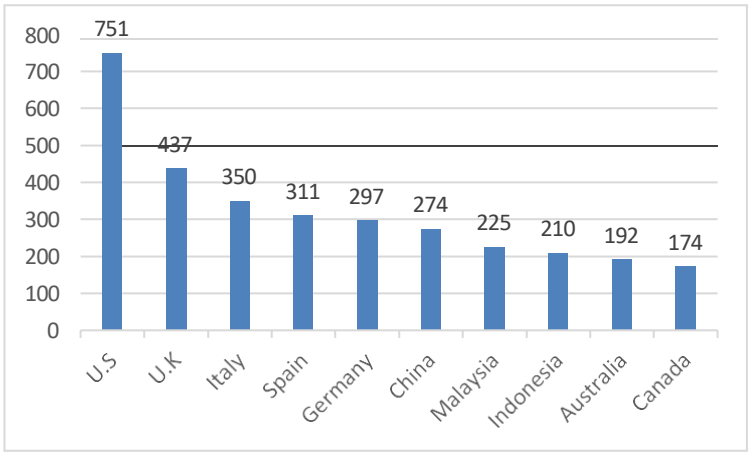


Figure 7. (a) The Country's Contribution to Science Edutainment Research

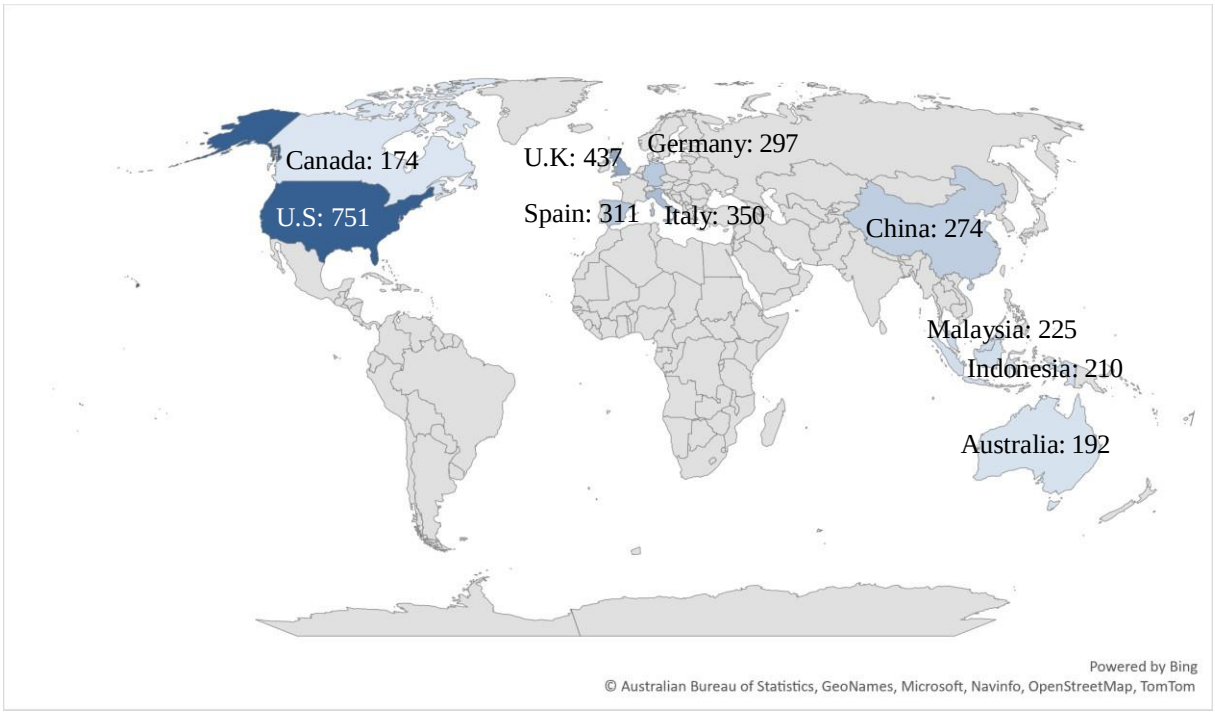


Figure 7. (b) Visualisation of Countries Contributing to Science Edutainment by Map

Science Edutainment Research Distribution by Language

Based on the language used in the Science Edutainment research documents, English is the dominant language used with a total of 4,788 documents. Complete data can be seen in Figure 8. Based on these data, no documents were found using Indonesian. This is because journals in Indonesia that are indexed by Scopus mostly use English as a template.

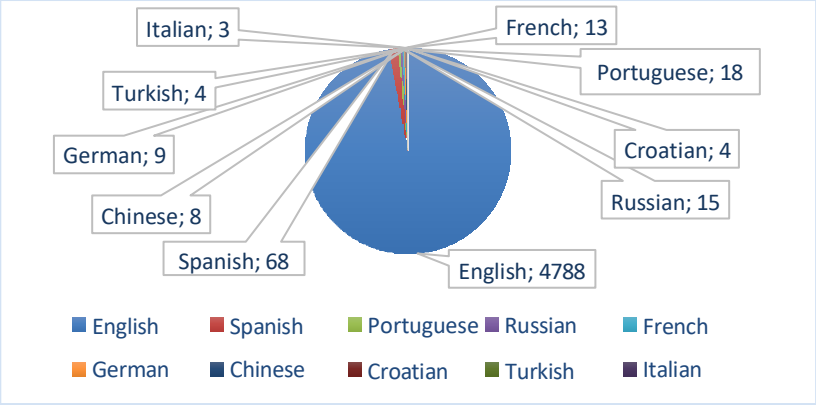


Figure 8. Language in Science Edutainment Document Research

Top Affiliation in Production Science Edutainment Research

One of the *tridharma* of higher education is research. Cultivating research activities requires the role of higher education leaders. The role of higher education leaders in cultivating research can be done by providing financial support, research information, motivation, making the right policies, building collaboration, facilitating the academic community, and a humanistic approach (Rifqi, 2018). Institutional affiliations have an important role in producing research documents on Science Edutainment. As a researcher, there are three challenges of being a scientist in an age of misinformation (Sylow, 2021). First, balancing correct interpretation of results with the need for promotion. Second, schism between the need for fast scientific communication and scientific trustworthiness. Third, tackling the social media platforms as they take a leading role in how we seek information. Through researchers from an institution, research on Science Edutainment is growing until now. The top ten institutional affiliations can be seen in Figure 9.

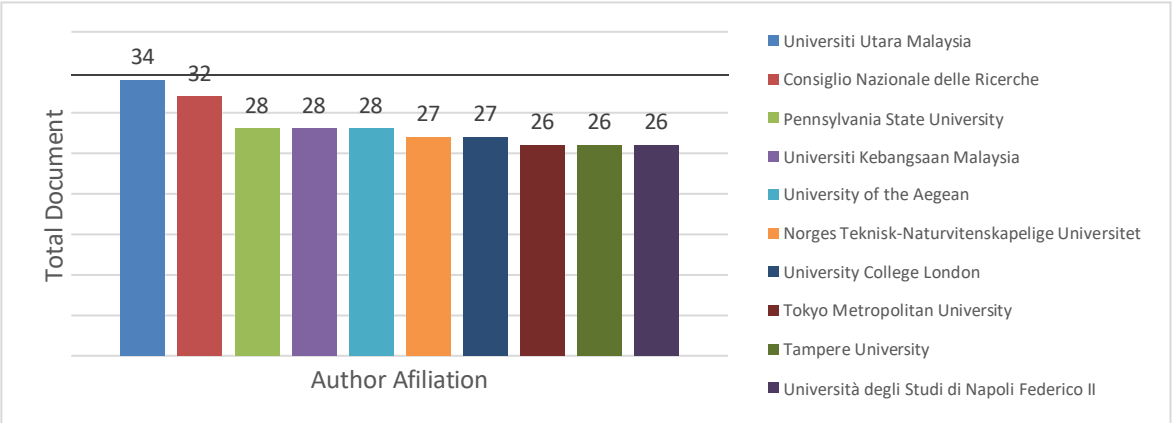


Figure 9. Number of Documents of Science Edutainment Across Institution

Figure 9 shows that Universiti Utara Malaysia is the institution that has produced the most science edutainment research documents with 34 documents. Even though there is no institution representing Indonesia in the top ten affiliates, Indonesia itself is the eighth country that has produced science edutainment research documents. In the future, it is hoped that Indonesian institutions will be more intense in developing research on science edutainment.

Top Author in Researching Science Edutainment During 2013-2022

Figure 10 presents a list of authors who produce the most science edutainment documents. In the first place is Naoyuki Kubota from Department of Mechanical Systems Engineering, Tokyo Metropolitan University, Tokyo, Japan, which produced 22 documents. There is no Indonesian writer's name in the list of top ten authors. Researchers in Indonesia are expected to be able to develop science edutainment learning due to the importance of designing interesting and educative science lessons.

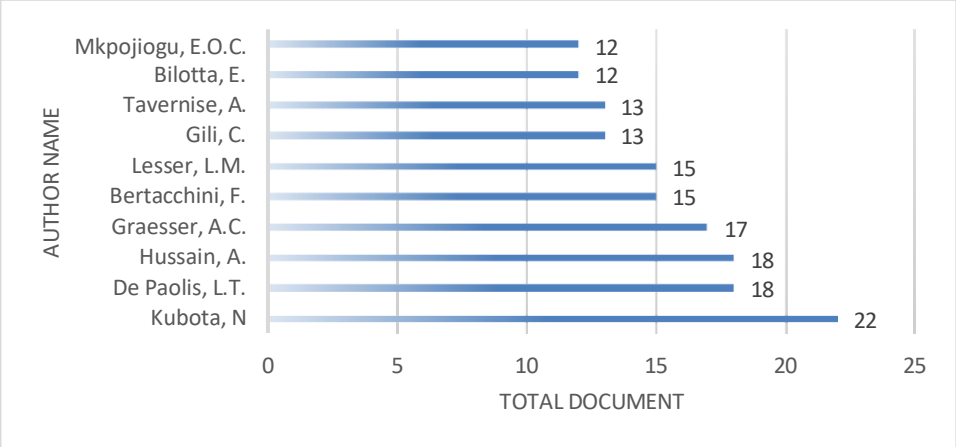


Figure 10. Top Author in Producing Science Edutainment Documents

Conclusion

Based on research results, science edutainment is an interesting topic and has been widely researched. Bibliometric results show that research trends from science edutainment tend to increase over the last ten years from 2013 to 2022. Network visualization shows that students are learning centers that implement science edutainment. There are six clusters that focus on students, social medium, virtual reality, internet, effectiveness, and digital tools related to Science Edutainment. The most types of documents are articles with 2,443 documents, followed by conference papers with 1,651 documents in second place. This is in line with the data shown in the most document sources, namely journals with 2,687 documents, followed by conference proceedings with 1,243 documents. The United States is the region that has produced the most documents, with 751 documents, while Indonesia is in eighth place with 210 documents. The dominant language used in documents is English with 4,788 documents. The affiliate that produced the most documents was Universiti Utara Malaysia with 34 documents. While the top prolific author is Naoyuki Kubota. Meanwhile, the opportunity and potential for future researchers to conduct science edutainment research are keywords that are few found, such as physics, ICT (Information, Communication, and Technology), and learning models.

References

Ananda, M. D., Sari, M., & Roza, M. (2021). Efektivitas Pembelajaran Physics Edutainment dengan Bantuan Media PhET terhadap Kemampuan Berfikir Logis Peserta Didik. *Natural Science: Jurnal Penelitian Bidang IPA Dan Pendidikan IPA*, *7*(2), Article 2. https://doi.org/10.15548/nsc.v7i2.2478

Andiwatir, A., Nay, F. A., & Talan, R. (2021). Model Pembelajaran SCL (Student Center Learning) pada Siswa Lamban Belajar (Slow Learner) Sekolah Menengah Pertama. *PEMBELAJAR: Jurnal Ilmu Pendidikan, Keguruan, dan Pembelajaran*, *5*(2), 117. https://doi.org/10.26858/pembelajar.v5i2.19595

Arief, I., & Handoko, H. (2016). *Jurnal Online dengan Open Journal System*. Lembaga Pengembangan Teknologi Informasi dan Komunikasi. https://doi.org/10.25077/9786026061317

Cascella, M., Perri, F., Ottaiano, A., Cuomo, A., Wirz, S., & Coluccia, S. (2022). Trends in Research on Artificial Intelligence in Anesthesia: A VOSviewer -Based Bibliometric Analysis. *Inteligencia Artificial*, *25*(70), 126–137. https://doi.org/10.4114/intartif.vol25iss70pp126-137

D. Indriati S.C.P. (2012). Meningkatkan Hasil Belajar IPA Konsep Cahaya Melalui Pembelajaran Science-Edutainment Berbantuan Media Animasi. *Jurnal Pendidikan IPA Indonesia*, *1*(2), 192–197.

Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business Research*, *133*, 285–296. https://doi.org/10.1016/j.jbusres.2021.04.070

Fardani, A. T. (2020). Penggunaan Teknologi Virtual Reality Untuk Sekolah Menengah Pertama Pada Tahun 2010-2020. *E-Tech*, *8*(1), 1–11.

Hidaayatullaah, H. N., Suprapto, N., Hariyono, E., Prahani, B. K., & Wulandari, D. (2021). Research Trends on Ethnoscience based Learning through Bibliometric Analysis: Contributed to Physics Learning. *Journal of Physics: Conference Series*, *2110*(1), 012026. https://doi.org/10.1088/1742-6596/2110/1/012026

Khoir, E. F., Suprapto, N., Setyarsih, W., & Deta, U. A. (2022). Literature Review Student's Metacognitive Ability: Bibliometric Analysis. *Journal of Teaching and Learning Physics*, *7*(1), 11–22. https://doi.org/10.15575/jotalp.v7i1.13698

Kim, Y. J., Valiente, J. A. R., Ifenthaler, D., Harpstead, E., & Rowe, E. (2022). Analytics for Game-Based Learning. *Journal of Learning Analytics*, *9*(3), 8–10. https://doi.org/10.18608/jla.2022.7929

Niemann, P., Bittner, L., Schrögel, P., & Hauser, C. (2020). Science Slams as Edutainment: A Reception Study. *Media and Communication*, *8*(1), 177–190. https://doi.org/10.17645/mac.v8i1.2459

Nilamsari, N. (2014). Memahami Studi Dokumen dalam Penelitian Kualitatif. *Wacana*, *13*(2).

Noor, F. M., Budhi, H. S., & Prasetyo, D. R. (2020). Scientific Work of Pre-Service Science Teacher in Basic Physics Practicum: Analysis of Major Background with Scientific Work Capabilities. *THABIEA : JOURNAL OF NATURAL SCIENCE TEACHING*, *3*(1), 51. https://doi.org/10.21043/thabiea.v3i1.7213

Noor, F. M., & Prasetyo, D. R. (2022). Research Trend of Subject Specific Pedagogy (SSP) in Physics Learning Through Bibliometric Analysis in 2012-2021 using Scopus Database and the Contribution of Indonesia. *International Seminar Commemorating The 100th Anniversary of Tamansiswa*, 249–260.

Noor, F. M., & Wilujeng, I. (2015). Pengembangan SSP Fisika Berbasis Pendekatan CTL untuk Meningkatkan Keterampilan Proses Sains dan Motivasi Belajar. *Jurnal Inovasi Pendidikan IPA*, *1*(1), 73. https://doi.org/10.21831/jipi.v1i1.4534

Paramita, R. W. D., Rizal, N., & Sulistyan, R. B. (2021). *Metode Penelitian Kuantitatif* (3rd ed.). Widyagama Press.

Prabha, S. (2020). Students' Views on Difficulties in Conceptual Understanding of Science at Secondary Stage. *The Eurasia Proceedings of Educational & Social Sciences (EPESS)*, *16*(1), 1–10.

Pranckutė, R. (2021). Web of Science (WoS) and Scopus: The Titans of Bibliographic Information in Today's Academic World. *Publications*, *9*(1), 12. https://doi.org/10.3390/publications9010012

Rifqi, A. (2018). Peeran Pimpinan Perguruan Tinggi dalam membudayakan Penelitian di Kalangan Dosen Universitas Nurul Jadid. *Universitas Studi Manajemen Pendidikan Islam.*

Salisbury, lutishoor. (2009). Web of Science and Scopus: A Comparativen Review of Content and Searching Capabilities. *The Charleston Advisor*.

Shodiqin, R. (2016). Pembelajaran Berbasis Edutainment. *Jurnal Al-Maqoyis*, *4*(1), 36–52.

Suprapto, N., Kholiq, A., Prahani, B. K., & Deta, U. A. (2021). Research on Physics of Photography: A Bibliometric Study (2000-2020). *Journal of Physics: Conference Series*, *2110*(1), 012017. https://doi.org/10.1088/1742-6596/2110/1/012017

Suseno, N. (2014). Pemetaan Analogi pada Konsep Abstrak Fisika. *Jurnal Pendidikan Fisika*, *2*(2). https://doi.org/10.24127/jpf.v2i2.118

Sylow, L. (2021). Three challenges of being a scientist in an age of misinformation. *The Journal of Physiology*, *599*(7), 1937–1938. https://doi.org/10.1113/JP281434

Taufiq, M., Dewi, N. R., & Widiyatmoko, A. (2014). Pengembangan Media Pembelajaran IPA Terpadu Berkarakter Peduli Lingkungan Tema "Konservasi" Berpendekatan Science-Edutainment. *Jurnal Pendidikan IPA Indonesia*, *3*(2). https://doi.org/10.15294/jpii.v3i2.3113