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ICTVT

INTERNATIONAL CONFERENCE ON TECHNOLOGY AND VOCATIONAL TEACHERS

The 5th ICTVT 2019:

Enhancing Technology and Vocational Competency for Smart Industry

ICTVT
International Conference
on Technology and Vocational Teachers

Organized by:
Faculty of Engineering
Universitas Negeri Yogyakarta, Indonesia.
September 14th - 15th, 2019

Preface

On behalf of the committee, I am very excited to welcome all of you to the International Conference on Technology and Vocational Teachers (ICTVT) held right here in Yogyakarta, Indonesia. This annual event is organized by Engineering Faculty, Universitas Negeri Yogyakarta and held from 14th to 15th September, 2019. The main purpose of this conference is to bring a unified communication platform for professional practice in engineering fields, researchers, vocational teachers, academia, and government.

Under the theme "Enhancing Technology and Vocational Competency for Smart Industry", the conference this year features a strong program, including three inspiring keynote speeches delivered by Dr. Dr. h.c. Georg Spöttl, M.A from German, Prof. Dr. Ramlee Mustapha from Malaysia, and Prof. Dr. Bruri Triyono from Indonesia. On top of that, we attracted more than 114 submissions from eight different countries. After reviewed by relevant experts, about 90 valuable research papers have been accepted for presentation. I would like to express our utmost gratitude to the keynote speeches, presenters, authors, and co-authors for contributing excellent papers.

Last but not least, I am grateful to all the technical program committee members involved in evaluating submitted papers, considering the merit through detail reviews, and selecting paper of the highest quality for oral presentation. I would like to thank all the organizing committee members and Faculty of Engineering, Universitas Negeri Yogyakarta, whose generous support contributed to the success of 2019 ICTVT. I hope it will have a fruitful and great value to everyone.

Yours Truly,

Suprapto, Ph.D.
Conference Chair, 2019 ICTVT,
Faculty of Engineering, Universitas Negeri Yogyakarta

Words from the Rector

Assalamu'alaikum Warahmatullah Wabarakatuh.
May peace and god's blessings be upon all of us.
Vocational education has received increased attention for the last decade. It, in turn, contributes to the preparation of vocational teachers. Preparing vocational teachers will take a lot of time, energy, and resources. It also needs supports from the development of technology.

The development of the technology, in particular the Internet, helps. In addition, integrating internet-based in the manufacturing industry has reinforced enhance the development of the field the need for the integration of the Internet in the teaching and learning process. It is to support the effort of coping with this rapid development that the 5th International Conference on Technology and Vocational Teachers (ICTVT 2019). It is expected that this conference will be a good forum for all of us to share research findings, best practices, ideas related to current trends in searching the appropriate technology and vocational competencies needed to cope with the smart industry.

Universitas Negeri Yogyakarta (UNY) has a high commitment to devote efforts to support the development of vocational education. One of the efforts related to such commitment is the preparation of the establishment of a vocational school to help provide workers with hands on experience and supported with adequate technological skills. With this commitment, we hope to improve impacts both nationally and internationally.

Finally, appreciation and gratitude are to all committee members and those who have been working hard to make this conference possible. Special thanks go to all the invited speakers who have been willing to share ideas here in these conferences.

Wassalamu'alaikum Warrahmatullah Wabarakatuh.

Yogyakarta, 10 September 2019

Rector of Universitas Negeri Yogyakarta
Prof. Dr. Sutrisna Wibawa, M.Pd.

Peer Review General Policies

Papers will be rejected as refereed paper if a sub-mission deadline is missed or if maximum capacity has been reached. Paper will then publish as an unrefereed paper at the ICTVT website (http://ictvt2019.uny.ac.id), we only received is allowed in general.

1. Paper will reject if submission or correction deadline is missed
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3. A reviewer shall not know the identity of another reviewer assigned to the paper
4. A reviewer shall not contact the author directly concerning the paper
5. Reviewer shall not make any personal remarks or comments that may betray their identity when entering the instructions for requested correction/revision of the paper
6. Reviewer must not referee papers of which they are author or co-authors
7. There are only 4 possible outcomes from the reviewers:
    - Accepted without correction
    - Accepted with minor correction
    - Accepted with major correction
    - Rejected
8. Decisions about paper rejection are final

Peer Review Acceptance Criteria

All papers published in this volume of IOP Conference Series: Materials Science and Engineering have been peer reviewed through processes administered by the proceedings Editors. Reviews were conducted by expert referees to the professional and scientific standards expected of a proceedings journal published by IOP Publishing. Here are the criteria:

1. The paper should comply the conference theme
2. The quality of content must have solid work and decent contribution
3. The paper must at least have significant for the theory and practices
4. Paper must discuss one step forward from the ordinary discussion
5. The paper quality has to be well written

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Reviewer must acknowledge they have read the referee guidance statements. Reviewer answer Yes/No to the following queries

1. Is the quality of content meet the requirement?
2. Is the significance for theory or practices meet the requirement?
3. Is there any innovative aspect in the paper?
4. Is the paper's theme align with the conference theme?
5. Is the paper present in proper way?

Outcome of the Referee Dialogue

1. If answer to 1) 2) and 3) are negative (no) then paper is uncorrectable (automatic rejection)
2. If answer to 1) – 5) are positive (yes) then paper is automatic accepted
3. If answer to 1) – 3) are positive but either 4) or 5) is negative then two cases exist
   a. Easy/straight forward to correct then: revise
   b. Difficult to correct then: reject

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Question: Is the paper acceptable for publication in its present form?
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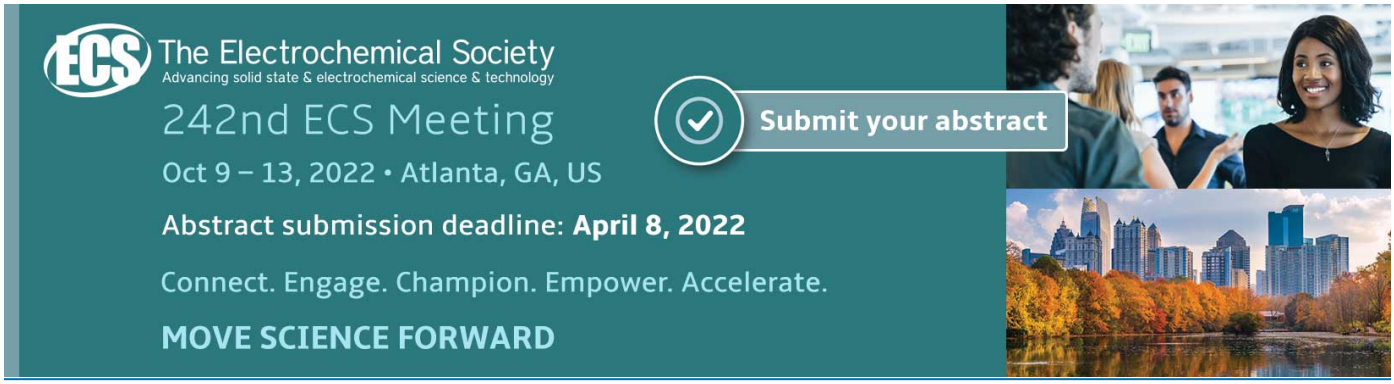

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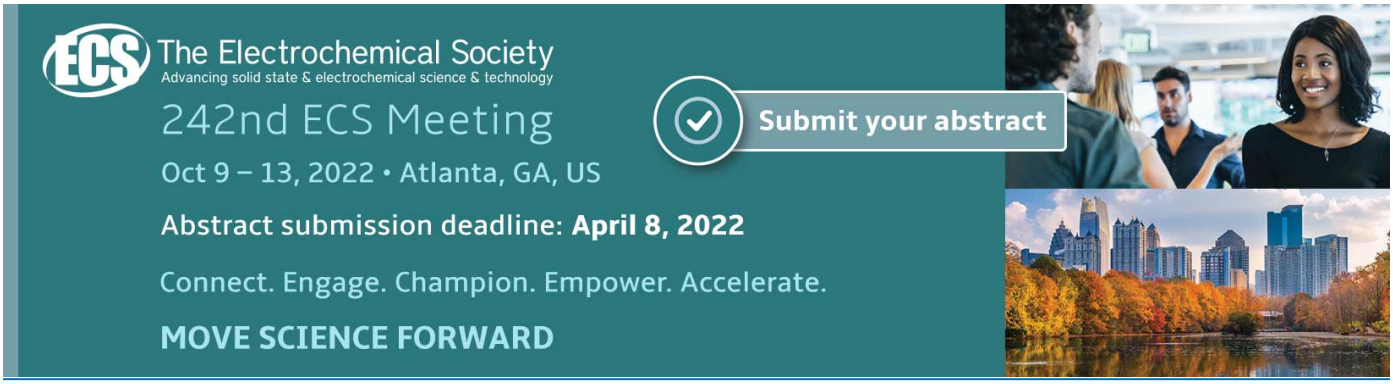

Continuous and integrated model of learning media and evaluation for vocational education application: A case in automotive biodiesel learning materials

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Abstract. Learning media and evaluation are very important parts of learning. Both of these must be present in learning. This article aims to study the combination of learning media and evaluation so that each learning material provided can be measured until the end of learning. The concept proposed is continuous and integrated model of learning media and evaluation for vocational education application. This concept is built based on studies of learning media and evaluation that had been done by previous researchers. Based on the previous studies, continuous and integrated conceptual models of learning media and evaluation are built. This would force and encourage students to be more active in comprehending the learning material presented in the media.

1. Introduction

Learning media is a communication device used by teachers to represent knowledge which will be transferred to the students [1]. Learning media affects different sensations and acts as an integral part of the learning process, and help provide meaningful experiences. Different learning media produce different abilities of students [2]. Learning media causes learning to be effective because media helps students achieve higher knowledge and longer memory, motivates students, and becomes the ideal tool for reviewing learning outcomes and for evaluating certain learning completeness [3]. Commonly, media used in learning are text, images, audio, video, and animation [4].

Thus, media takes a very important roles in a learning process. Using media, the learning objectives can be achieved better. Concerning with the automotive education field in vocational education, students meet many difficulties to master automotive material [5] [6] and competencies needed by the company [7]. The evaluation results related to the automotive material become less than the passing grade, so that students are not competent. In connection with this, the need for learning media in educational institutions in the automotive sector is very urgent [8]. Now days, learning media has been facilitated by computer which makes teacher more easy to teach.

Many learning media researches had been conducted. Kevri et al [9] developed computer-based learning media to improve student learning outcomes in lighting engineering learning materials and outdoor installation projects. The results of his research show that student learning outcomes can be increased by using computer-based learning media. In another study, Lu and Cheung [10] also made computer technology-based learning to improve the effectiveness of teaching and learning. Chang [11]

developed competency-based web learning material for strengthening student competence. Chang [12] developed a web-based electronic evaluation and measurement system as a tool to evaluate student learning outcomes. Huang and Cappel [13] also developed a web-based assessment system for information system subject matter. In another study, Kay [14] developed evaluation and evaluation scales of learning, design, and learning convenience through web-based learning tools.

Based on several researches above, computer-based learning media are grouped into web-based (online) and non web-based (offline) media. Besides, there is no learning media that specifically contains material in the automotive field, learning media developed from several studies are separated systemically between learning media [9], [11], [12] and its evaluation system [13], [14]. In this study, a continuous and integrated media and evaluation model was developed. This means that in each sub learning material is directly followed by evaluation to measure the sub learning material mastery before going to the next sub learning material.

Students cannot proceed to further sub material in the learning media before meeting the passing grade in the earlier sub material. Students who can take part in the evaluation at the end of the material session mean being able to follow and master the material presented in the previous learning media. So, the objective of this study is to propose a continuous and integrated model of learning media and evaluation for vocational education application. This finding can be used by teachers as a teaching aids and will contribute to increase student mastery of automotive fuel leaning material especially in biodiesel fuel.

2. Recent concept of learning media and evaluation

Learning media should support learning by emphasizing, strengthening, and mentoring the cognitive processes of students. This learning fosters the ability of students to learn independently, be proactive, independent, patient, have a responsibility to learn, be able to learn independently, and have a high sense of curiosity [14]. Technology-based learning (e-learning) provides broad learning opportunities without limited time and place, able to accommodate a variety of educational strategies and methods. This system can also be used in conventional classes by using an activity management system [15]. Characteristics of students using e-learning systems are independent, highly motivated, high self-confidence, self-regulating, and more sporty [16]. The technology-based learning can be facilitated by bringing computer into the learning process.

Computers become a device that cannot be separated in the learning process. The technology approach, which includes multimedia applications that contain text, graphics, and other media, is becoming increasingly important for students at school. The use of multimedia makes learning easy, more affordable, unlimited accessible, and easy to understand [17]. The four basic features of computer-based learning according to Sidhu [18] are: (1) the speed of the computer can respond the individual needs of students, (2) computers can offer and respond to student interactions, (3) potential to represent information within the broad scope from text format to video, (4) the opportunity to provide an unlimited choice of learning paths.

One of the terms of the use of computers in learning is computer-based training (CBT), in which students learn by implementing special training programs on computers. CBT is very effective for training using computer applications because CBT programs can be integrated with applications so students can practice using the application while they are learning [19]. The keyword for computer-facilitated learning is interaction [20] and is required to actively think [21].

One method to activate students in learning is action learning covering activity, experiential learning, role play, and simulation (including computer simulations) or learning by doing [22]. This is in accordance with Westwood [23] that constructivism becomes the dominant view of how students learn which leads to active learning methods by focusing on students playing an active role and play a major role in getting information and developing concepts and skills while interacting with their social and physical environment.

Related to computer-based learning evaluation, computer-based classes require several methods to evaluate student learning. One way to evaluate is by gathering information from students' weekly

assignments, activeness in online discussions, paper and presentation assignments, midterm evaluations, and face-to-face discussions [24]. For web-based learning outcomes tests, computer-based tests allow students to read test questions on the monitor screen, answer with a mouse or keyboard, retest and correct the exam, send answers, and log out after completion [25]. Computer-based tests are grouped into formative tests and summative tests. Formative tests provide information on achieving learning objectives and summative tests provide information on the achievement of several learning objectives [26].

Based on the study above, learning media makes teachers easy to transfer learning material, and also makes students easier to understand the learning material provided by the teacher. At the end of the learning session, evaluation was carried out in the form of formative tests to measure the achievement of learning objectives. In this study, it is designed a learning media concept combining learning media and evaluation in an integrated manner where evaluation is not done at the end of the learning session, but in each presented material is always followed by evaluation before continuing to the next material. The order of the presented material starts from cognition levels C1, C2, C3, C4, C5, and C6. Each material presentation at level C1 (for example) is immediately followed by an evaluation of mastery of the material at that level. If the evaluation at level C1 is successful, students can got to material C2 and so on.

3. Method

This study was a research and development (R&D) carried out through 10 steps [27]: (1) research and information collecting, (2) planning, (3) developing preliminary form of product, (4) preliminary field testing, (5) main product revision, (6) main field testing, (7) operational product revision, (8) operational field testing, (9) final product revision, and (10) dissemination and implementation. This research is still going on, and especially in this article, we discuss the product (Figure 1) produced from the first, second, and third steps of R&D [27]. For the next activities, this product will be preliminary field tested, and field tested, until dissemination and implementation step.

4. Result and discussion

The learning media concept offered in this study is a continuous model of learning media, meaning that the learning material presented in the earlier section continues to the next learning material, but the evaluation for measuring comprehension of the earlier material is immediately carried out (integrated) with serial forms. If students do not pass the C1 level test, for example, then this learning media automatically does not allow students (as learning media users) to learn the next material. Students must re-learn the initial material until they can pass the test to proceed to the next material. Schematically, the continuous and integrated model of learning media and evaluation can be illustrated as the following diagram.

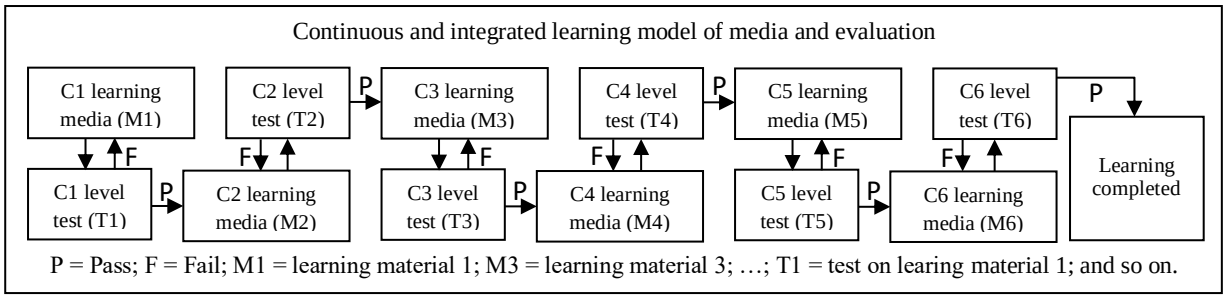

Figure 1. Continuous and integrated model of learning media and evaluation

The explanation of the picture above is as follows: C1 learning media (M1) means learning media whose content is at the cognitive level 1 (knowledge); C2 learning media (M2) means learning media whose content is at cognitive level 2 (understanding); C3 learning media (M3) means learning media whose content is at the cognitive level 3 (application); C4 learning media (M4) means learning media

whose content is at cognitive level 4 (analysis); C5 learning media (M5) means learning media whose content is at the cognitive level 5 (evaluation); and C6 learning media (M6) means learning media whose content is at the cognitive level 6 (creating).

C1 level test (T1) means test carried out at the cognitive level 1 (knowledge); C2 level test (T2) means test carried out at cognitive level 2 (understanding); C3 level test (T3) means test carried out at the cognitive level 3 (application); C4 level test (T4) means test carried out at cognitive level 4 (analysis); C5 level test (T5) means test carried out at the cognitive level 5 (evaluation); and C6 level test (T6) means test carried out at the cognitive level 6 (creating).

Computer-based learning media as conceptualized in Figure 1, encourage students to master learning material 1 (M1) before being able to study learning material 2 (M2). Automatically, the learning media will block students from entering M2 before passing test 1 (T1). This will force and encourage students to be more active in comprehend the learning material presented in the media. The success of students in mastering learning material will be reflected in the ability of students to reach the end of this media (learning completed).

The concept of continuous and integrated learning media as shown in Figure 1, can be applied to all learning materials. Especially in this study, the content of the learning material used as an example is the automotive biodiesel teaching material. The concept of learning media with biodiesel content can be seen in Figure 2.

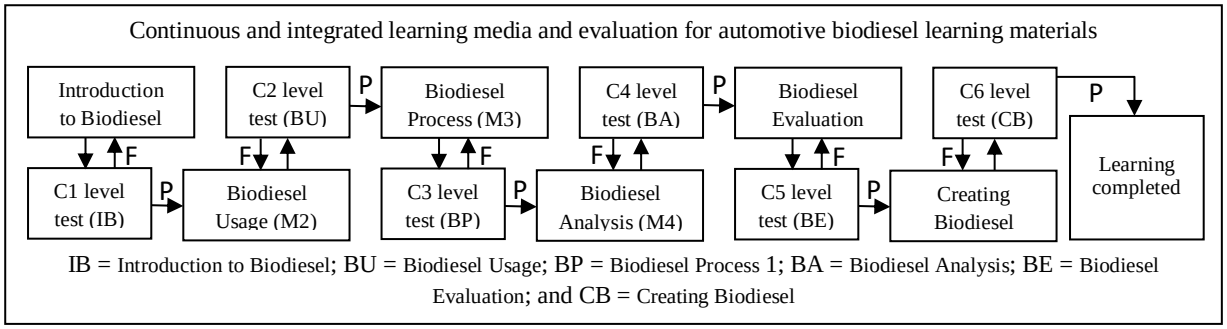

Figure 2. Continuous and integrated model of learning media and evaluation for automotive biodiesel learning materials

The concept of learning media as shown in Figure 2 can be realized in the form of learning media that can be used by educators and students to master the biodiesel learning material. The material presented starts from material easily understood by students (C1) to a high cognitive level of creation (C6). Students who can independently reach the end of learning media are considered to have sufficient knowledge about biodiesel.

Learning activity facilitated by good learning media will motivate students in learning [3]. The continuous and integrated model of learning media and evaluation of the automotive biodiesel learning material will encourage students to learn and pass the tests that they must face after learning the first material and subsequent material. With the demands that must be immediately fulfilled by students in this learning media, students will get a different sensation and feel to be integrated part of the learning process [2] which will eventually get a meaningful experience. Therefore, mastery of biodiesel will be achieved by using this learning media, because this learning media can help students gain higher knowledge and longer memory [3].

This media will deliver students to the level of knowledge that must be achieved through systematic stages starting from the level of knowledge, understanding, application, analysis, evaluation, to the highest level, namely creating. With this computer-based learning media, it will be able to improve learning outcomes [9], the effectiveness of teaching and learning process [10], and strengthen student competence [11]. An integration of computer-based learning media and evaluation become a new model in learning process which is very suitable to be applied in vocational education. In addition to biodiesel

material, all learning material that has the nature of knowledge and skills can be simulated through continuous-integrated learning media and evaluation

5. Conclusion

The integration of computer-based learning media and evaluation become a new model in learning process which is suitable to be applied in vocational education. This continuous and integrated learning media will force and encourage students to be more active in comprehend the learning material (in this case biodiesel learning material) presented in the media. Mastery of biodiesel will be achieved by using this learning media, because this learning media can help students gain higher knowledge and longer memory

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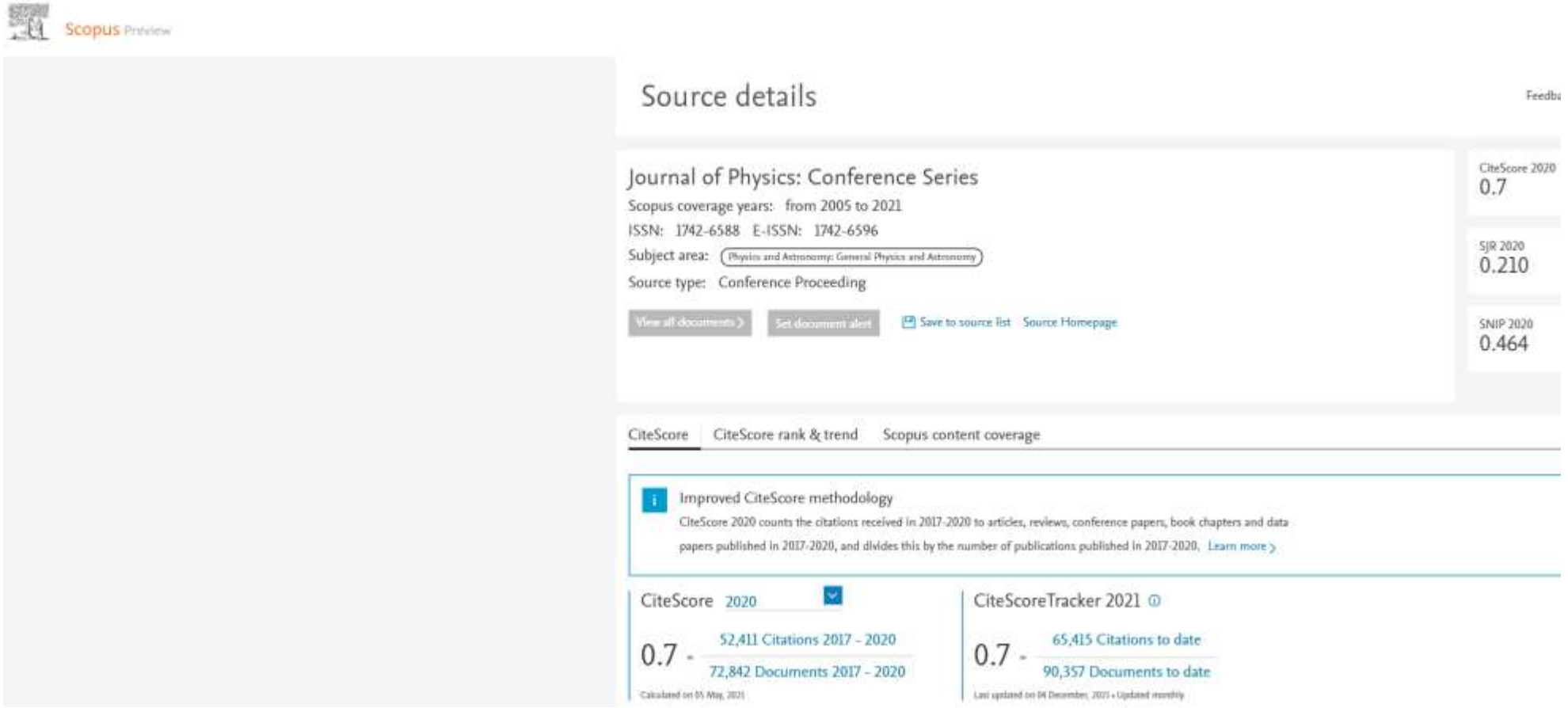

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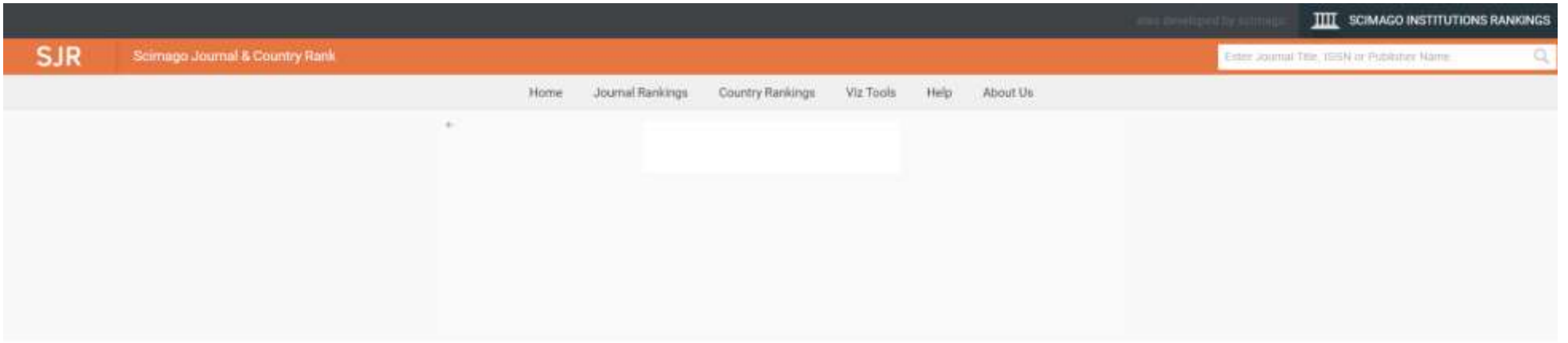

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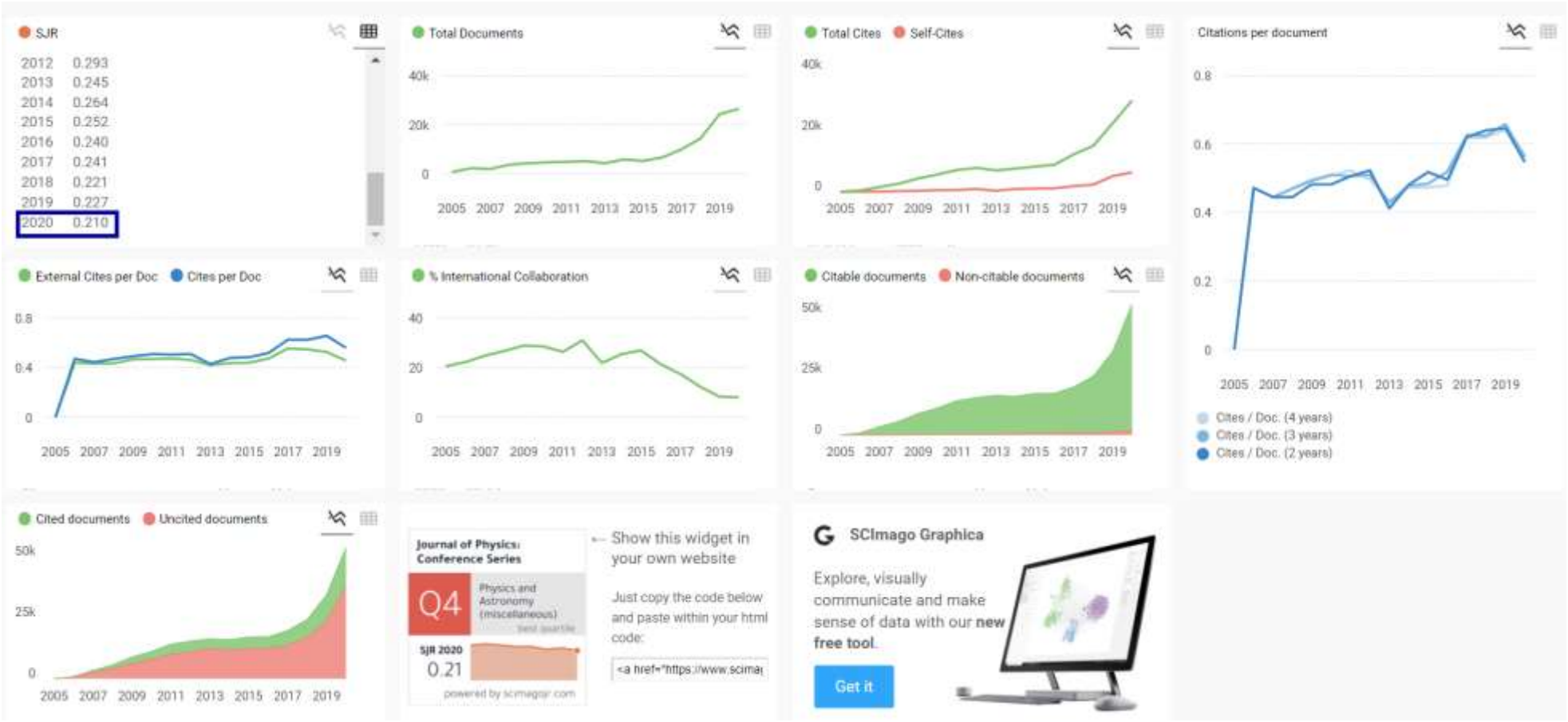

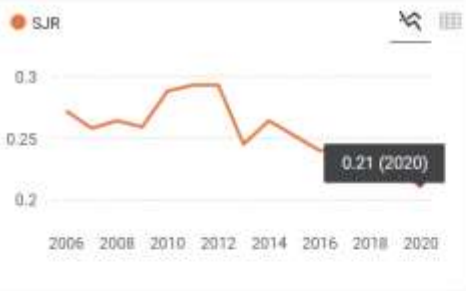

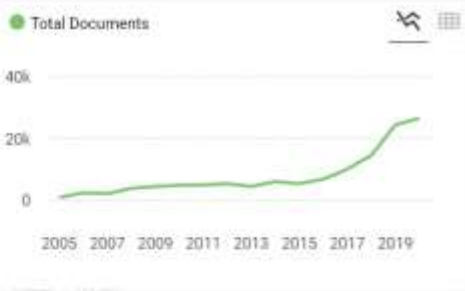

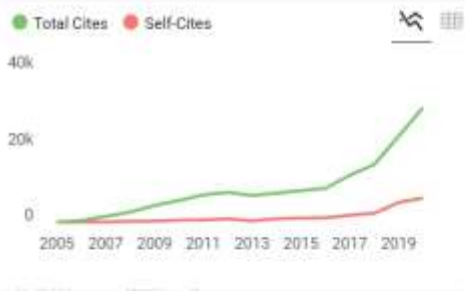

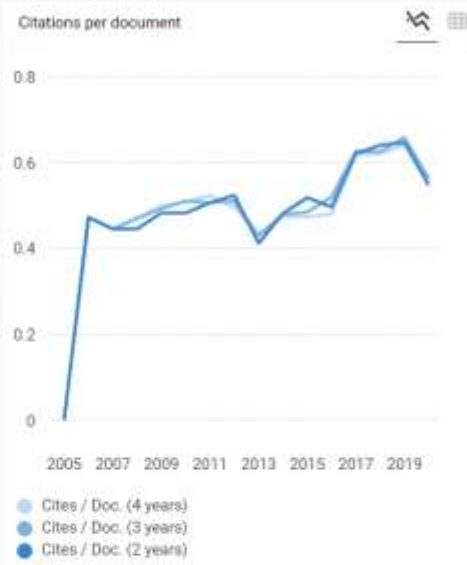

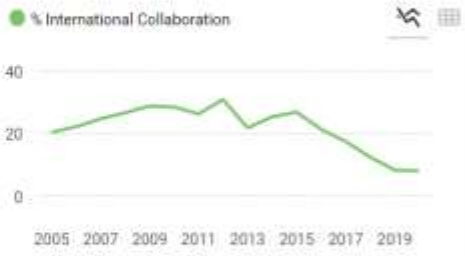

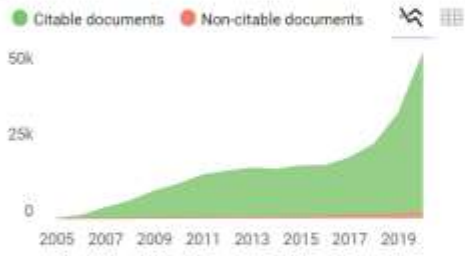

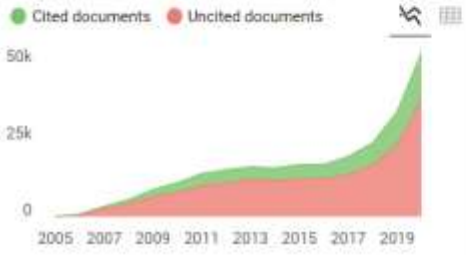

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