hasil-STEM ISCIT learning tools to improve Integrative Scientific Thinking

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STEM ISCIT learning tools to improve Integrative Scientific Thinking.

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ABSTRACT

Learning in the era of the new university regulations experienced a revolution in the learning style of students and in the teaching style of teachers. Because this situation causes many changes in the learning system. To achieve learning that meets these conditions, different types of learning alternatives are carried out. Integrative STEM was selected as one of the learning models in the era of the new order. However, inclusive STEM learning is difficult to do without the use of support or learning tools, especially in distance learning. Based on these needs, this research was carried out to develop support devices for the integrative STEM model in universities for physics class students. This research is research and development, research and development (R&D). The development model used uses a 4D development model. The 4D model is synonymous with definition design, development and dissemination. In this study, an assistive device model was developed in the form of an integrative MINT learning device. The results of the analysis show that the development of integrative learning tools based on STEM for students is rated as good, with an average of 80%.

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I. Introduction

Covid19 has become widespread, so the government had to make the decision to close schools and universities by switching to distance education [1]. Several initiatives have been taken to ensure that learning activities continue. The sudden shift from classroom teaching to distance education at home also indicates the need for increased teaching skills [2] [3]. One type of PJJ is online learning. The online learning system is a learning system without direct contact between teachers and students, but online through the Internet [4]. This condition also requires teachers to innovate in learning [5], [6], to be more creative in the design of learning that can be implemented online to foster students' independence and thinking skills [7].

The implementation of innovative, pedagogical and communicative learning can be done by selecting the

learning methods used and optimizing technology, pedagogy and content. To achieve the learning objectives according to the level of difficulty of the material, the teacher tries to implement different learning models [8], [9]. Most of the learning models that are attempted are student-oriented learning models. One of the models some teachers focus on is a learning model that builds science, technology, engineering, and math (STEM) content.

An interesting learning model according to Zheng (2019) to examine the integration of TPC is the MINT approach, since this MINT-based learning method is capable of solving phenomena through the simultaneous application of knowledge and skills [10]. Research suggests that the MINT learning model focuses the educational process on solving real everyday problems by developing various aspects of attitudes, knowledge, and skills and increasing critical thinking and the ability to form logic [11]. Another study found that the STEM learning model could empower students to solve problems, and stated in their study that the STEM learning model could empower children to get used to finding solutions [12]. In addition, it can stimulate the ability to convey information easily, have patience, teamwork, and various mental skills that can be applied to individuality and daily life. Another take on the benefits of STEM is that STEM-based learning empowers students' thinking skills. However, that the cause of STEM learning was not optimally achieved because teachers still failed to gain full student engagement, critical thinking, and promote communication skills [13], [14]. Furthermore, literacy among students in terms of understanding of concepts and facts remains limited.

Furthermore, inclusive learning prepares students to recognize their own abilities and make appropriate decisions [15]. Deep knowledge of science, technology, and mathematics is a prerequisite for making the right decisions, good analytical skills, accurate data collection methods, and excellent communication skills [16]. The results of the analysis suggest that the future needs of teacher training candidates include the integration of mastery of pedagogical and professional competencies, mastery of TPC skills in the presentation of learning materials, and the ability of students to perform well. critical thinking skills, proper decision making. and competition in Mediation require data. Based on preliminary studies and studies, it is interesting to study studies on the development of STEM learning models to improve pedagogical and professional skills [14], [17]. Additionally, researchers will also work with Integrative Scientific Thinking (ISCIT) in STEM learning. Then the STEM Integrative Scientific Thinking (STEM ISCIT) learning model is developed. During STEM learning, learning tools are needed to support the learning process. Building on the importance of devices in STEM learning, this study was conducted to develop integrated STEM-based learning tools in universities for physics students.

II. Theory

STEM (Science, Technology, Engeneering, and Mathematics)

STEM education means providing practical strengthening of education in STEM fields separately, as well as further developing an educational approach that integrates physics, technology, engineering, and mathematics by focusing the educational process on solving real problems in everyday life or professional life [14]. In Indonesia, STEM will help education because the purpose of education and STEM is to develop students with higher order thinking skills as creative and critical thinking. STEM is an integrated learning approach that connects real-world applications with classroom learning that includes four disciplines, namely natural sciences (physics), technology, engineering results, and mathematics.

The STEM approach connects learning with four teaching components, namely Science, Technology, Engineering, and Mathematics [18]. In line with this, the STEM approach can be implemented at the level of formal education/in the classroom and the level of non-formal units/outside the classroom. STEM in recent years has been widely applied in several countries such as in Taiwan. In Indonesia, STEM has also been used in recent years [12]. Learning using the STEM approach is expected to be able to build and develop Physics Education students so that they not only memorize concepts, but are also guided to be able to integrate Physics, technology, engineering, and mathematics so that they can improve critical thinking skills in Physics Education students towards learning materials. to be applied to teach science, especially physics because studying physics does not only discuss mathematical formulas but also uses other components, such as technology and engineering to understand a material. The approach using STEM can seek to bring up skills in Physics Education students, for example the ability to solve problems and the ability to conduct investigations [19]–[21]. These skills are important to help improve human resources.

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Learning Media

Learning tools are things that must be prepared by teachers before carrying out learning [22]. Devices are tools or equipment, while learning is a process or way of making people learn [23]. Learning devices are tools or equipment to carry out processes that allow educators and students to carry out learning activities. Learning tools become a guide for teachers in carrying out learning both in the classroom, laboratory or outside the classroom. In Permendikbud No. 65 of 2013 concerning Standards for Primary and Secondary Education, it is stated that the preparation of learning tools is part of learning planning. Learning planning is designed in the form of a syllabus and lesson plans that refer to content standards. In addition, the learning planning also includes the preparation of learning media and resources, assessment tools, and learning scenarios [24].

III. Method

The development procedure needs to involve product testing and research implementation is carried out systematically to achieve an expected result. Therefore, this research development procedure uses 4D [25]. The following is a research flow chart shown in Figure 1.

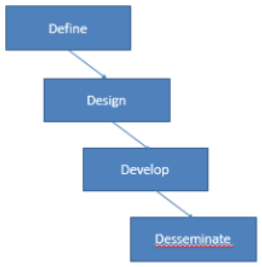

Figure 1. Research Flowchart

Define

This step is carried out to determine and define development needs. This definition is an analysis of development needs, research and development models that are suitable for product development needs and product development that is tailored to user needs. Analysis can be done through literature searches or preliminary studies [26].

Design

The design stage (planning) is to make the initial product (prototype). The prototype is the initial model (pre-model), then developed during development. The development stage aims to produce a supporting device for the ISCIT STEM learning model. The development of learning support devices begins with designing a model supporting device. The device developed is a supporting device for the ISCIT STEM learning model. The device was developed based on syntax (stages), namely a description of the implementation of the model in the field in teaching and learning activities. Syntax can be described as a systematic process of learning activities related to the implementation of the model.

Develop

Sugiyono's book (2015), the development stage can be divided into two activities: evaluation by experts and development testing [26]. Assessment by experts is a method for validating or evaluating the feasibility of a product design. These activities are assessed by experts in each field. The suggestions given are used to improve the teaching materials and learning designs that have been prepared. The validation results are used to improve the product. After the product is repaired, it is retested to achieve effective results.

Dessiminate

Sugiyono's book (2015) The dissemination stage can be divided into three activities: verification testing, packaging, dissemination, and recruitment. In the validation testing stage, the product modified in the development stage is deployed to the actual target. Implementation also measures the achievement of goals. This measurement is carried out to ensure the validity of the developed product. After the product is implemented, the developer must see the results of achieving the goals. The final activities in the development stage are packaging, and distribution. This procedure is done to make the product available to others. The field test at the disseminate stage involved 60 Physics Education students. In this test, research is carried out using products that have been developed and refined.

IV. Results and Discussion

Define

A. Preliminary Analysis

Based on the literature study that has been carried out, the initiative is carried out to ensure that the activity takes place. The change from face-to-face methods in the classroom to distance learning at home indicates the need to increase teaching capacity [1] [2]. one type of PJJ is bold learning. The bold learning system is a learning system without direct face to face between teachers and students, but online using the internet network [3]. This condition also requires teachers to make innovations in learning [4], to be more creative in designing learning that can be applied boldly to foster student independence and thinking skills [5]. Based on the importance of students' critical thinking and the need for students to be associated with science, technology, mathematics, and engineering in learning, the application of STEM learning

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in Higher Education is carried out [6], [7]. In the STEM learning process, learning devices are needed that can support the learning process.

B. Task Analysis

Task analysis is carried out to analyze the main tasks that must be mastered by the subject to achieve minimum competence. The analysis is done by making indicators of achievement for each competency to be improved.

C. Concept Analysis

Conceptual analysis consists of a concept map that is used as a means to achieve a certain ability to systematically determine the main parts of the study material. From the results obtained, the material that will be used for the development of Integrative STEM learning devices on magnetic material and electromagnetic induction with the product to be made is an integrative STEM learning device.

D. Formulation of Learning Objectives

Analysis of learning objectives is carried out to determine indicators of material analysis and curriculum analysis. Based on material analysis and curriculum analysis, the manufacture of Integrative STEM learning tools on magnetic material and Electromagnetic Induction is carried out.

Design

The design stage (planning) is to make the initial product (prototype). The product developed is an Integrative STEM learning tool. Planning is done by making a draft for further validation and testing on the subject.

3. Development

The development stage is divided into two activities, namely: expert evaluation and development testing. Expert evaluation is a technique to verify or evaluate the feasibility of a product design. The evaluation is carried out by experts in their respective fields. The suggestions given are used to improve the teaching materials and designs that have been prepared. Development testing is a product design testing activity aimed at the actual target object.

Based on expert test data analysis, it can be seen that the product produced through this research has been declared very feasible, with several suggestions for improvement

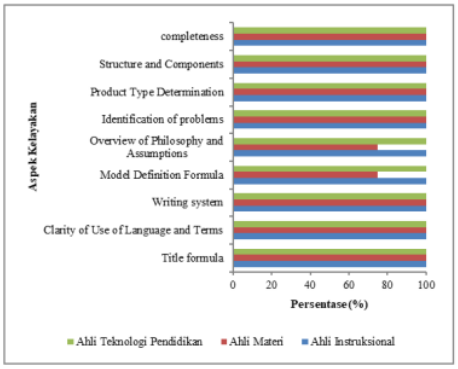

Figure 2. Summary Graph of Expert Consensus on Integrative STEM Learning Tools

Based on Figure 2 the Integrative STEM learning device developed is very feasible. Validation data were obtained from three experts, namely Physics education experts, Instructional experts and Learning Technology experts. From the aspect of title formulation, it can be seen that the average obtained is 100% that the model book made in the aspect of title formulation has an effective and efficient short title formulation, does not cause double interpretation, the display is legible (size and typeface are appropriate), and the suitability of the color composition selection already well.

From a review of aspects of language clarity and terminology/components, it can be seen that the level of expert consensus on the feasibility of the book model has reached 100%. This shows that the experts agree that the clarity of the use of language and the terminology used is very suitable for formulating the developed book model. Clarity of language and terminology are terms used in simple, clear models, will not cause misunderstanding and can be understood by readers, as well as the use of common foreign languages and applicable terms of use.

In addition, in terms of the systematic aspects/components of the model, the level of expert consensus on the developed Integrative STEM learning tools has reached 100%. This means that experts agree that the system model compiled is very suitable to be used as part of the Integrative STEM learning tool. Expert opinion is based on evaluation, showing that the documents developed in the model book: systematics according to indicators that are consistent and interesting to the reader (readability), systematics according to consistency between projects, systematics according to intervention design, and systematics based on research and theory development (basic equipment).

Another aspect is the formulation of the definition of the expert consensus model which reaches the 75%

level, indicating that the student activity designs that have been prepared are feasible to use. This feasibility is based on evaluation results showing that the toolkit has: clear and understandable sources, current or contemporary (containing visionary elements), comprehensive compilation, and elements that fit the model and definition. They are prepared comprehensively, objectively and decisively. Among the four experts, only the material expert gave an unworthiness rating or percentage (75%) in this regard, and the other two experts gave a very good level of consensus. This is because the material experts are of the opinion that the model book in the definition section of the development model is not in accordance with the development model. Furthermore, the model book was improved based on input from material experts to be further validated without being reassessed.

Judging from the formulation and hypotheses of the philosophical review, it can be seen that the average consensus level of experts has reached 88%, which indicates that the planned teaching activity plan is declared feasible as part of the teaching activity. Philosophical comments and hypotheses are used. This level of consensus is based on the results of the evaluation, namely that the developed model book has considered the formulation and assumptions of philosophical comments as useful. The breadth and depth of the philosophical hypotheses and commentaries are drawn up with cultural backgrounds in mind. The formulation of philosophical and hypothetical reviews designed according to the context of life and the development of science and technology. The formulation of philosophical reviews and hypotheses are generalized from to specific (already coherent). As in the formulation of the model definition, in the formulation of hypotheses and this philosophical review, the material also provides the least appropriate level of consensus (50%), while the other three experts think it is very feasible. Because, according to material experts, both the breadth and depth of philosophical interpretation need to be slightly improved. Furthermore, the model book was improved based on input from material experts to be further validated without being reassessed.

From the following aspects, namely problem identification, the consensus of experts has reached an average level of 100%, which indicates that the evaluation system designed is considered very suitable as part of the problem identification system. This feasibility is based on the evaluation results which show that the resulting model book covers the existing problems, namely the demands of the world of education and identification of problems based on the needs of the development of science and technology. As the dynamics of the world work, problem identification is based on the need to improve the efficiency and effectiveness of the education/learning process, and problem identification is based on a comprehensive needs analysis. Another aspect of the Expert's evaluation of the effectiveness of the model book is the determination of the type of product. From this aspect, it can be seen that the consensus of the experts has reached 100% which indicates that it is very suitable as an expert.

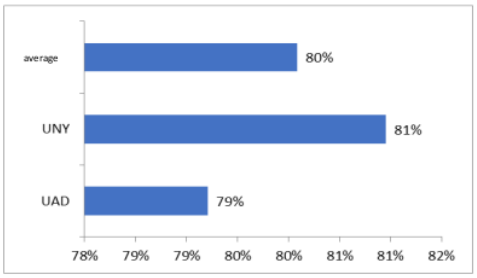

Figure 3. Student response data to the Integrative STEM Learning Tool

The way to do a field trial is to test the product made on 60 Physics Education students. The results obtained have a good perception of 45.55 from a score of 56 and a percentage of 79% of the developed framework. Based on Figure 2, it can be concluded that the developed framework is categorized as good. The assessed aspects consist of rationality, supporting theory, social system, reaction principle, support system, instructional impact and accompaniment impact, instructional implementation instructions, learning environment and management tasks, and evaluation.

Conclusion

The STEM ISCIT learning tool to improve Integrative Science Thinking has been created. Based on the results of the data obtained, it shows that this device is suitable to be used to support the STEM ISCIT model in the new normal era. This study has limitations, namely that it is only used to determine the effectiveness of the ISCIT STEM learning device to improve Integrative Scientific Thinking on magnetic electricity. Suggestions for further research are to conduct expanded research and add learning tools to other materials

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References

[1] H. d'Orville, "COVID-19 causes unprecedented educational disruption: Is there a road towards a new normal?," *Prospects*, vol. 49, no. 1–2, pp. 11–15, 2020, doi: 10.1007/s11125-020-09475-0.

[2] M. S. Panggabean and K. K. Himawan, "The Development of Indonesian Teacher Competence Questionnaire," *Journal of Educational, Health and Community Psychology*, vol. 5, no. 2, p. 1, 2016, doi: 10.12928/jehcp.v5i2.5134.

[3] P. Makhashova *et al.*, "On the development of professional competence in students of creative pedagogical specialties," *International Journal of Environmental and Science Education*, vol. 11, no. 11, pp. 4660–4668, 2016.

[4] A. Asmuni, "Problematika Pembelajaran Daring di Masa Pandemi Covid-19 dan Solusi Pemecahannya," *Jurnal Paedagogy*, vol. 7, no. 4, p. 281, 2020, doi: 10.33394/jp.v7i4.2941.

[5] L. D. Herliandry, N. Nurhasanah, M. E. Suban, and H. Kuswanto, "Pembelajaran Pada Masa Pandemi Covid-19," *JTP - Jurnal Teknologi Pendidikan*, vol. 22, no. 1, pp. 65–70, 2020, doi: 10.21009/jtp.v22i1.15286.

[6] L. D. Herliandry, Nurhasanah, M. E. Suban, and K. Heru, "Transformasi Media Pembelajaran Pada Masa Pandemi Covid-19," *Jurnal Teknologi Pendidikan*, vol. 22, no. 1, pp. 65–70, 2020, [Online]. Available: http://journal.unj.ac.id/unj/index.php/jtp.

[7] A. M. Saifulloh and M. Darwis, "Manajemen Pembelajaran dalam Meningkatkan Efektivitas Proses Belajar Mengajar di Masa Pandemi Covid-19," *Bidayatuna: Jurnal Pendidikan Guru Mandrasah Ibtidaiyah*, vol. 3, no. 2, p. 285, 2020, doi: 10.36835/bidayatuna.v3i2.638.

[8] A. Hussein, M. M. Gaber, E. Elyan, and C. Jayne, "Imitation Learning," *ACM Computing Surveys*, vol. 50, no. 2, pp. 1–35, Jun. 2017, doi: 10.1145/3054912.

[9] N. Zaimah, A. Nurain, and S. Hussain, "Effects of current density on size and surface morphology of high speed direct nano-crystalline nickel plating on titanium surface," *ARPN Journal of Engineering and Applied Sciences*, vol. 10, no. 17, pp. 7864–7869, 2015.

[10] S. Li, H. Du, W. Xing, J. Zheng, G. Chen, and C. Xie, "Examining temporal dynamics of self-regulated learning behaviors in STEM learning: A network approach," *Computers and Education*, vol. 158, no. August, p. 103987, 2020, doi: 10.1016/j.compedu.2020.103987.

[11] D. Sartika, "Pentingnya Pendidikan Berbasis Stem Dalam Kurikulum 2013," *JISIP (Jurnal Ilmu Sosial Dan Pendidikan)*, vol. 3, no. 3, 2019.

[12] P. Chaiwongsa, N. Kinboon, and N. Yanasarn, "STEM - Play, Learn and Work: STEM Education in Academic Club Based on Community and Local Products to Improve a Positive Attitude towards STEM," *Journal of Physics: Conference Series*, vol. 1340, p. 012004, Oct. 2019, doi: 10.1088/1742-6596/1340/1/012004.

[13] C. D. Putri, I. D. Pursitasari*, and B. Rubini, "Problem Based Learning Terintegrasi STEM Di Era Pandemi Covid-19 Untuk Meningkatkan Keterampilan Berpikir Kritis Siswa," *Jurnal IPA & Pembelajaran IPA*, vol. 4, no. 2, pp. 193–204, Dec. 2020, doi: 10.24815/jipi.v4i2.17859.

[14] E. H. M. Shahali, L. Halim, M. S. Rasul, K. Osman, and M. A. Zulkifeli, "STEM learning through engineering design: Impact on middle secondary students' interest towards STEM," *Eurasia Journal of Mathematics, Science and Technology Education*, vol. 13, no. 5, pp. 1189–1211, Dec. 2017, doi: 10.12973/eurasia.2017.00667a.

[15] R. Santagata and C. Yeh, "The role of perception , interpretation , and decision making in the development of beginning teachers ' competence," *ZDM*, vol. 48, no. 1, pp. 153–165, 2016, doi: 10.1007/s11858-015-0737-9.

[16] C. Oonk, J. T. M. Gulikers, P. J. den Brok, R. Wesselink, P. J. Beers, and M. Mulder, "Teachers as brokers: adding a university-society perspective to higher education teacher competence profiles," *Higher Education*, vol. 80, no. 4, pp. 701–718, 2020, doi: 10.1007/s10734-020-00510-9.

[17] A. Roberts and D. Cantu, "Applying STEM instructional strategies to design and technology curriculum," *PATT 26 Conference: Technology Education in the 21st Century*, pp. 111–118, 2012.

[18] Iskandar, D. Sastradika, Jumadi, Pujianto, and D. Defrianti, "Development of creative thinking skills through STEM-based instruction in senior high school student," *Journal of Physics: Conference Series*, vol. 1567, p. 042043, Jun. 2020, doi: 10.1088/1742-6596/1567/4/042043.

[19] J. R. Chittum, B. D. Jones, S. Akalin, and Á. B. Schram, "The effects of an afterschool STEM

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e-ISSN: 2621-2889

program on students' motivation and engagement," *International Journal of STEM Education*, vol. 4, no. 1, 2017, doi: 10.1186/s40594-017-0065-4.

[20] I. Ghergulescu, T. Lynch, M. Bratu, A. Moldovan, C. H. Muntean, And G. M. Muntean, "Stem Education With Atomic Structure Virtual Lab For Learners With Special Education Needs."

[21] M. Timms *Et Al*., *Challenges In Stem Learning In Australian Schools Literature And Policy Review*. .

[22] H. S. Budhi and U. Fawaida, "Pengembangan Perangkat dan Model Pembelajaran Berbasis Proyek Mata Kuliah IPA Terpadu Melalui Pendekatan STEM (Science, Technology, Engineering and Mathematics)," *Jurnal Ilmiah Edukasia*, vol. 1, no. 1, pp. 99–111, 2021, doi: 10.26877/jie.v1i1.7969.

[23] S. Fitria, F. Ainun, and Widia;, "Pengembangan Perangkat Pembelajaran Model PBL Berbasis STEM untuk Melatih Keterampilan Berfikir Kreatif Siswa Tuna Netra," *Jurnal Pendidikan Mipa*, vol. 9, no. 1, pp. 38–44, 2019, doi: 10.37630/jpm.v9i1.180.

[24] R. Ardiansyah, D. Diella, and H. Y. Suhendi, "Pelatihan Pengembangan Perangkat Pembelajaran Abad 21 Dengan Model Pembelajaran Project Based Learning Berbasis STEM Bagi Guru IPA," *Publikasi Pendidikan*, vol. 10, no. 1, p. 31, 2020, doi: 10.26858/publikan.v10i1.12172.

[25] W. Maba, "Conducting assessment instrument models for teacher competence, teacher welfare as an effort to enhance education quality," *International Research Journal of Management, IT and Social Sciences*, vol. 5, no. 3, pp. 46–52, 2018, doi: 10.21744/irjmis.v5i3.667.

[26] H. Hikmawati, C. Sahidu, K. Kosim, S. Sutrio, and G. Gunawan, "Tahap Define dalam Pengembangan Perangkat Pembelajaran Berbasis STEM untuk Meningkatkan Keterampilan Berpikir Tingkat Tinggi Mahasiswa," *Kappa Journal*, vol. 4, no. 2, pp. 149–157, 2020, doi: 10.29408/kpj.v4i2.2666.

[23] S. Fitria, F. Ainun, and Widia;, "Pengembangan Perangkat Pembelajaran Model PBL Berbasis STEM untuk Melatih Keterampilan Berfikir Kreatif Siswa Tuna Netra," *Jurnal Pendidikan Mipa*, vol. 9, no. 1, pp. 38–44, 2019, doi: 10.37630/jpm.v9i1.180.

[24] R. Ardiansyah, D. Diella, and H. Y. Suhendi, "Pelatihan Pengembangan Perangkat Pembelajaran Abad 21 Dengan Model Pembelajaran Project Based Learning Berbasis STEM Bagi Guru IPA," *Publikasi Pendidikan*, vol. 10, no. 1, p. 31, 2020, doi: 10.26858/publikan.v10i1.12172.

[25] W. Maba, "Conducting assessment instrument models for teacher competence, teacher welfare as an effort to enhance education quality," *International Research Journal of Management, IT and Social Sciences*, vol. 5, no. 3, pp. 46–52,

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28 Alfiani Indah Pratiwi, Widha Sunarno, Sugiyarto Sugiyarto. "Science Learning Tools Project Based Learning (PjBL) Model With STEM Approach To Improve Mastery of Junior High School Student's Concepts on Environmental Pollution Materials", Proceedings of the 4th International Conference on Learning Innovation and Quality Education, 2020 <1%
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course: A STEM-based science learning", Journal of Physics: Conference Series, 2019
Publication

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