Select Language

English

Submit

Publisher

(http://fkip.unej.ac.id)

Vi (http://pancaranpendidikan.or.id/datas.php)sit (http://pancaranpendidikan.or.id/tabels.php)or

(http://s11.flagcounter.com/more/btY7)

Honorary Editor

- Prof. Dr Bambang Soepeno M.Pd, University of Jember, Indonesia

Editor in Chief

- Drs. Nuriman Ph.D, University of Jember, Indonesia

Managing Editors

- Prof. Dr. Suratno, M.Si, University of Jember, Indonesia
- Lioni Anka Monalisa, S.Pd, M.Pd, University of Jember, Indonesia

Layouting and Graphical Editors

- Ervin Oktavianingtyas, S.Pd, M.Pd, University of Jember, Indonesia
- Zainur Rasyid Ridlo S.Pd, M.Pd, University of Jember

Editorial Member

- Prof. Dr. Marijono, Dipl. Rsl, University of Jember, Indonesia
- Prof Dr. M. Sulthon M.Pd, University of Jember, Indonesia
- Prof. Dr. Sutarto M.Pd, University of Jember, Indonesia
- Prof. Dr. Indrawati, M.Pd, University of Jember, Indonesia
- Prof. Dr. I Ketut Mahardika, M.Pd, University of Jember, Indonesia
- Prof. Dr. Joko Waluyo M.Si, University of Jember, Indonesia
- Prof. Dr. Sunardi, M.Pd, University of Jember, Indonesia
- Prof. Drs. Slamin, M.Comp.Sc, Ph.D, University of Jember, Indonesia
- Prof. Drs. Dafik M.Sc, Ph.D, University of Jember, Indonesia
- Prof. Dr. Kusno DEA, University of Jember, Indonesia
- Prof. Drs. I Made Tirta, M.Sc, Ph.D, University of Jember, Indonesia
- Dr. Sukidin, M.Pd, University of Jember, Indonesia
- Dr. Dwi Wahyuni M.Kes, University of Jember, Indonesia
- Dr. Arju Mutiah M.Pd, University of Jember, Indonesia

Open Journal Systems (http://pkp.sfu.ca/ojs/)

Author Guidelines (http://pancaranpendidikan.or.id/template_pancaran/AUTHOR GUIDELINES FOR Pancaran Pendidikan.pdf)

Template (http://pancaranpendidikan.or.id/template_pancaran/template_pancaran_new_2020.docx)

Copyright (http://pancaranpendidikan.or.id/template_pancaran/copyright-pancaran.pdf)

Indexed by (http://pkp.sfu.ca/ojs/)

(http://sinta.ristekdikti.go.id/journals/detail?id=5744) (https://search.crossref.org/?q=pancaran+pendidikan)

Select Language

English

Submit

Publisher

(http://fkip.unej.ac.id)

Vi (http://pancaranpendidikan.or.id/datas.php)sit (http://pancaranpendidikan.or.id/tabels.php)or

(http://s11.flagcounter.com/more/btY7)

Article

The Effect of Education Game as a Learning Media for Students Achievement in the Covid 19 Pandemic Era
(http://pancaranpendidikan.or.id/index.php/pancaran/article/view/315)
Ikhwatul Hasan, Rizal Amri, Dimas Pratama
DOI : 10.25037/pancaran.v9i4.315 (http://dx.doi.org/10.25037/pancaran.v9i4.315)
Untitled (http://pancaranpendidikan.or.id/index.php/pancaran/article/view/315/372) PDF (http://pancaranpendidikan.or.id/index.php/pancaran/article/view/315/373) | View 134 times ,

Mother-Child Communication Pattern on Awe-Awe Doer Family: A Study in Kalibaru Manis Village Banyuwangi Regency
(http://pancaranpendidikan.or.id/index.php/pancaran/article/view/316)
Senny Weyara Dienda Saputri, Khutobah Khutobah, Dwi Risqiana
DOI : 10.25037/pancaran.v9i4.316 (http://dx.doi.org/10.25037/pancaran.v9i4.316)
PDF (http://pancaranpendidikan.or.id/index.php/pancaran/article/view/316/374) | View 145 times ,

The Application of Problem-Based Learning in Mathematics Education on Several South East Asia High Schools
(http://pancaranpendidikan.or.id/index.php/pancaran/article/view/327)
Tri Dyah Prastiti, Dafik Dafik, Aldyon Restu Azkarahman
DOI : 10.25037/pancaran.v9i4.327 (http://dx.doi.org/10.25037/pancaran.v9i4.327)
PDF (http://pancaranpendidikan.or.id/index.php/pancaran/article/view/327/379) | View 166 times ,

Tikio (TikTok App Educational Video) Based on the Character Education of Newton's Laws Concepts Preferred to Learning for Generation Z
(http://pancaranpendidikan.or.id/index.php/pancaran/article/view/325)
Risky Januar Syah, Siti Nurjanah, Veneranda Putri Andri Mayu
DOI : 10.25037/pancaran.v9i4.325 (http://dx.doi.org/10.25037/pancaran.v9i4.325)
PDF (http://pancaranpendidikan.or.id/index.php/pancaran/article/view/325/377) | View 1935 times ,

The Analysis of Melde Tool as Learning Media on Students Senior High School
(http://pancaranpendidikan.or.id/index.php/pancaran/article/view/311)
Zul Jalal Hadi, Nazar Amrullah, Aruna Akbar Zhafransyah
DOI : 10.25037/pancaran.v9i4.311 (http://dx.doi.org/10.25037/pancaran.v9i4.311)
PDF (http://pancaranpendidikan.or.id/index.php/pancaran/article/view/311/368) | View 231 times ,

Available online at
http://www.pancaranpendidikan.or.id

Pancaran Pendidikan FKIP
Universitas Jember
Vol. 9, No. 4, Page 1-10, Nopember, 2020

Pancaran Pendidikan

DOI:
10.25037/pancaran.v9i4.309

ISSN 0852-601X
e-ISSN 2549-838X

Flip Book Innovation on Maglev Train Principles on Electromagnetic Induction Material to Grow Learning Motivation and Scientific Creativity

H Ruspitasari[1], W Munawaroh[1], S N Mahbubiyah Royani [1], Supeno[1]
[1]University of Jember, Jember, Indonesia
Email: heniruspitasari103@gmail.com*

ARTICLE INFO

Article History:
Received Date: 1th Oktober 2020
Received in Revised Form Date: 10th Oktober 2020
Accepted Date: 15th Oktober 2020
Published online Date 01st Nopember 2020

Key Words:
Teaching materials; motivation to learn; scientific creativity

ABSTRACT

Scientific motivation and creativity are important components that must be developed in learning physics. Some research has been done to develop motivation and scientific creativity but still experience obstacles in the form of a lack of learning modules that can be used as a guide for students in independent learning. The author offers flip book innovations on the principles of the Maglev train on electromagnetic induction material to foster learning motivation and scientific creativity. This flip book consists of material and test instruments. The material covers the history of the Maglev train, parts of the Maglev train, the principles of the Maglev train, each of which is analyzed by Science, Technology, Engineering, Art and Mathematic. The results of this study are obtaining flip books on the subject of class XII electromagnetic induction to foster learning motivation and scientific creativity.

INTRODUCTION

Scientific motivation and creativity are important components that must be developed in learning physics. Motivation is usually defined as a process that stimulates our behavior or moves us to action (Arends, 2012). Motivation is an internal process that activates, guides, and maintains behavior over time. There are many different types, intensities, goals and directions of motivation. Motivation to learn is very important for students and teachers (Sjukur, 2012). Physics learning motivation has indicators, namely: (1) aspects of choice or interest in tasks / activities, (2) aspects of effort or efforts made to succeed, (3) aspects of persistence or persistence in completing tasks, and (4) aspects of self-confidence during the activity.

Scientific creativity is an intellectual property or ability of a person to produce or has the potential to produce original scientific products that have social or personal value, and are designed with specific objectives, using the information provided. The instruments of scientific creativity have the following indicators, 1). unusual uses, 2). sensitivity to science problems

(problem finding), 3). ability to increase product usability and value (product improvement), 4). the ability of scientific imagination (creative imagination), 5). creative problem solving skills (problem solving), 6). design ability of scientific observation steps (science experiment), 7). creative design capabilities of product science (product design) (Hu and Adey, 2002).

Motivation and creativity are very beneficial for students. With motivation students will be more enthusiastic in participating in learning. Motivation is one of the most important elements that must be considered by teachers in learning so that learning can run effectively (Arends, 2012). Motivation cannot be characterized, because motivation has a vital role in the process of providing enthusiasm, direction, and persistence of behavior (Santrock, 2008). Many studies have shown that students' learning motivation towards a lesson is a factor that influences student achievement in their learning outcomes (Christidou, 2011). Besides motivation, creativity also benefits students. Students who have high creativity can potentially find new innovations. The results of scientific creativity instruments (KI) show that students with KI above the average shows the value of Higher Level Cognitive Learning Outcomes (HBKTT) better than students with KI below the average (Ramadhani and Motlan, 2015). Ceran et al. (2014) which shows a positive and significant correlation between scientific creativity with science learning achievement, science learning outcomes, academic achievement, and students' thinking ability. The level of student creativity gives a real role to the ability to solve problems in physics and teaching and learning in contextual learning settings is very helpful for knowing student creativity (Sambada, 2012).

Physics learning so far has not yet optimized the development of student motivation and creativity. Some research has been done to develop motivation and creativity. Researches to improve students' motivation to learn physics and creativity include the effect of the Discovery Learning model on Learning Motivation and physics learning outcomes of MAN students in Bondowoso (Putri, 2017), development of physics modules based on community technology science (STM) on static fluid material to increase motivation and class X high school student learning outcomes (Reality, 2016), the development of project-based physics learning modules (Project Based Learning) on static fluid material to enhance the learning creativity of class X high school / high school students (Novianto, 2018), the development of somatic-based physics modules, auditory, visual, intellectual (savi) to improve students' creativity in class X SMA / MA with the topic of heat and displacement (Novitayani, 2016). However, there are still some obstacles in the development of project-based physics learning modules (Project Based Learning) on static fluid material to increase the learning creativity of high school / high school students (Novianto, 2018) in the form of a lack of learning modules that can be used as a guide for students in independent learning.

Electronic-based learning resources and teaching materials have several advantages. The advantage of electronic media is that it looks consistent. If viewed from the benefits of electronic media itself can make the learning process more interesting, interactive, can be done anytime and anywhere and can improve the quality of learning (Wiyoko et al, 2014). Research conducted by Santosa, et al, (2017), shows that the use of electronic modules is able to motivate students and increase student independence. Hapsari & Widodo, 2016, reported the results of his research that the use of constructivist-metacognitive-based teaching materials was effective to improve students 'metacognition skills and knowledge to improve students' metacognition skills and knowledge.

Electronic modules as a form of digital-based learning resources. Learning activities in the 2013 curriculum must also utilize the role of information and communication technology to improve the efficiency and effectiveness of learning (Permendikbud No. 65 of 2013). Electronic module is a form of presentation of independent learning materials that are systematically arranged into the smallest learning units to achieve certain learning objectives that are presented in an electronic format in which there are animations, audio, navigation that makes users more interactive with the program (Sugianto, 2013) . The author offers a Flip book Innovation on the Principles of the Maglev Train on Electromagnetic Induction Material to Grow Learning Motivation and Scientific Creativity. The purpose of this study is to develop a flip book on the principle of the Maglev train on electromagnetic induction material to foster motivation to learn and scientific creativity in high school students. The author hopes the benefits of this paper so that boring physics learning becomes more interesting and can foster motivation to learn and scientific creativity so that it can support the creation of human resources technology literacy in Industry 4.0.

METHODOLOGY

This type of research used in this research is educational development research to produce development products in the form of flip books. This development research aims to develop a flip book based on the approach of Science, Technology, Engineering, Art and Mathematic (STEAM) and contextual as a valid, practical, interesting and effective product to foster motivation in learning and scientific creativity of high school students.

This research procedure refers to the development model proposed by Nieveen and Plomp (2006) which includes preliminary research, prototyping stage, assessment stage, and systematic reflection and documentation. Flip books that have been developed are then assessed by experts using validation sheets. The validation sheet contains a score used by experts to assess the quality of the flip book components

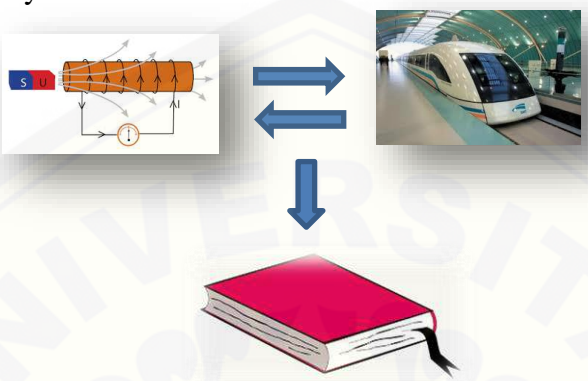
RESULT AND DISCUSSION

Vidgram Based On Audio Visual Media

The product made is in the form of a flip book on electromagnetic induction material. Flip book on the principle of Maglev train is an alternative learning media to foster learning motivation and scientific creativity in learning physics which is used as a medium that can support the creation of human resources in technology literacy in Industry 4.0. The ability to think creatively is needed to be a reliable Human Resources (HR) in the life of the community and the world of work, especially entering the ASEAN free market. Good character is needed to balance the virtual world without limits (Almuharomah, et al, 2019).

Flip book on electromagnetic induction material is a solution to the problems that arise in research on the development of project-based physics learning modules (Project Based Learning) on static fluid material to increase student creativity in class X high school / high school (Novianto, 2018) in the form of a lack of learning modules that can used as a guide for students in independent learning. This flip book on electromagnetic induction material can be accessed online wherever and whenever as long as there is a computer or android device and a smooth internet connection so that it can be a guide for students in independent learning. The results of this study are supported by research by Wijayanto (2014) which states that the development of modules that are packaged in electronics allows students to be able to study independently because they can be read using a computer or electronic book reader.

The Maglev train is one of the contexts of daily student life that can explain physics learning material, namely electromagnetic induction material as shown in figure 1. Learning by using contextual modules will increase student learning creativity. This is in accordance with the research of Prastuti et al (2018), learning using contextual-based physics modules can increase student learning creativity.



(Source: author's personal document)

Figure 1. The Maglev Train is a context for learning Electromagnetic Induction material

(Source: author's personal document)

Figure 2. The Attractiveness the flip book activities on the Maglev train principle

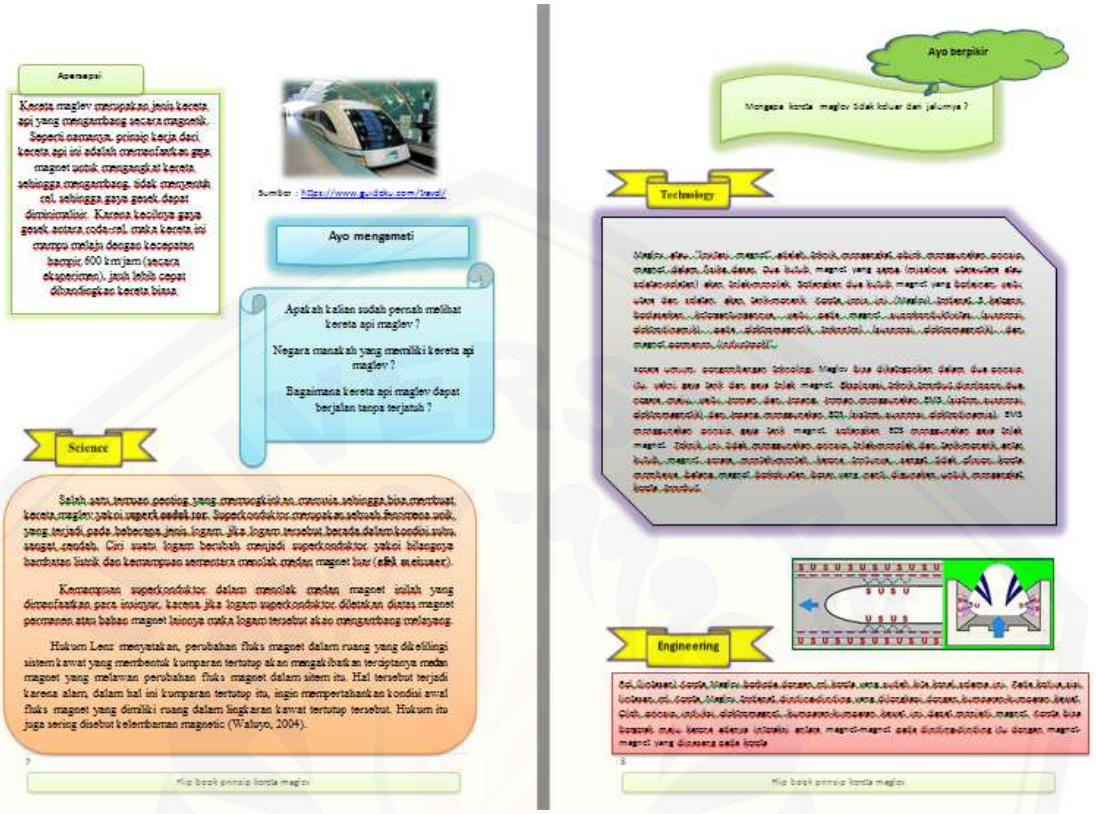
The excitement of activities on the flip book on the principle of the Maglev train increases learning motivation. This is in accordance with research (Brophy 2004) states that one of the indicators of learning motivation is physics: aspects of choice or interest in tasks / activities. Flip

book on the principle of Maglev train fosters motivation to study physics with a flip book fulfilling indicators, namely: (1) aspects of choice or interest in tasks / activities, (2) aspects of the effort or effort made to succeed, (3) aspects of perseverance or persistence in completing tasks, and (4) aspects of self-confidence during activities. At the point of attractiveness the task of this flip book has quite interesting activities as shown in figure 2.

In Figure 2, Flipbook illustrates the principle of the Maglev train in accordance with point 1 of the indicators to foster motivation, which is to have interesting learning activities to do. These learning activities can be done online wherever and whenever provided that there is a good internet connection because it uses a PhET online simulator. One of the characteristics of a good module according to the Ministry of National Education (2008) steps in each experiment activity are arranged using simple and clear sentences so as to minimize errors in implementation. The answer column is provided according to the expected answer. The instructions of each activity have also used sentences that are clear and easy to understand.

Scientific creativity is the ability to find and solve new problems, and the ability to formulate hypotheses; usually involves some addition to initial knowledge. If students are involved with inquiry work, they will be more creative in determining variables, methods and equipment, and so on (Aktamis and Ergin, 2008). Learning to foster scientific creativity is one of them by training initial knowledge by way of exposure to daily life related to learning material then providing knowledge with the STEAM approach. The scientific creativity skills used in the preparation of this flip book consist of the indicators of scientific creativity instruments: 1). unusual uses, 2). sensitivity to science problems (problem finding), 3). ability to increase product usability and value (product improvement), 4). the ability of scientific imagination (creative imagination), 5). creative problem solving skills (problem solving), 6). design ability of scientific observation steps (science experiment), 7). creative design capabilities of product science (product design) (Hu and Adey, 2002).

The flip book component of the Maglev train principle on electromagnetic induction material includes the material stages and test instruments. The material covers the history of the Maglev train, sections on the Maglev train, the principles of the Maglev train, each of which has sub chapters of the Science, Technology, Engineering, Art and Mathematic studies as shown in figure 3.



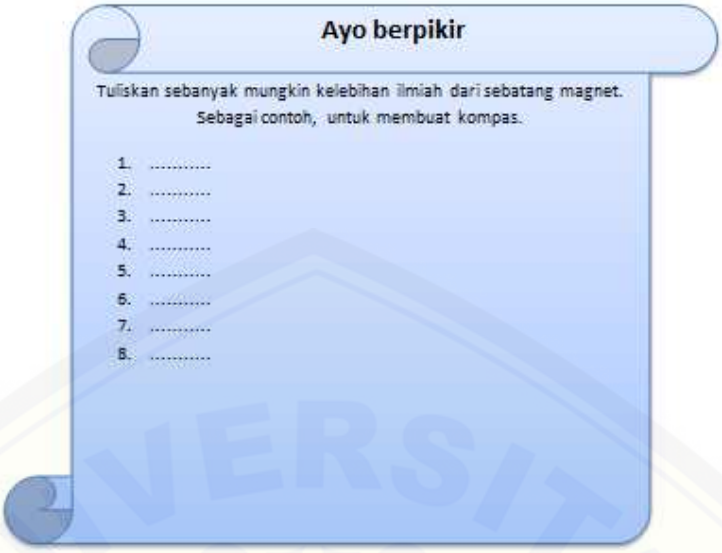
(Source: author's personal document)

Figure 3. Flip book material on the principle of the maglev train STEAM analysis

This analysis is useful to explain the advanced transportation of the Maglev train from its working principle explained through STEAM. The principle of superconducting ability to resist magnetic fields is used by engineers, because if superconducting metal is placed on a permanent magnet or other magnetic material then the metal will float (science), the development of Maglev technology can be categorized into two principles, namely the tensile force and magnetic repulsion. Exploration of the technique was pioneered by two developed countries, namely Germany and Japan. Germany uses an electromagnetic suspension system and Japan uses an electrodynamic suspension system (technology), the Rail (track) Maglev train is different from the railroad that we have known so far. On both sides of the Maglev Railroad tracks there are walls equipped with wire coils (Engineering).

Flip book on the principle of the Maglev train on electromagnetic induction material fulfills indicators of scientific creativity. For example, the indicator point 4 is the ability to increase product usability and value (product improvement). STEAM analysis in the flipbook meets the indicator point 4 with the historical analysis of the Maglev train, which is the transformation from a steam train to a diesel engine that is more powerful and more efficient than a steam locomotive. Then the discovery of the first magnetic train that has a speed above the speed of ordinary trains, This train is called the Maglev Train (Magnetic Levitation).

The test instrument on the flip book about the principle of the Maglev train in the form of open questions is one of the test instruments that can measure students' scientific creativity as shown in figure 4. This is consistent with the results of research Hu (2002) which states that the test with open questions is very useful in measuring students' scientific creativity.



(Source: author's personal document)

Figure 4. The instrument of scientific creativity tests on the flip book about the principle of the maglev train STEAM analysis

The question fosters scientific creativity in students by fulfilling the skills that are indicators of scientific creativity instruments: 1). unusual uses, 2). sensitivity to science problems (problem finding), 3). ability to increase product usability and value (product improvement), 4). the ability of scientific imagination (creative imagination), 5). creative problem solving skills (problem solving), 6). design ability of scientific observation steps (science experiment), 7). creative design capabilities of scientific products (product design). This is in accordance with research Glerum, et al (2012) which states that, the questions presented are open-ended, which encourages students to give diverse answers and not be fixed on one answer. The diversity of answers in open questions is broader than closed questions. But this test has a requirement that students have been taught the material being tested. These conditions are given because if they have not been given then the students' knowledge of the material does not support making it difficult to measure creativity. This is in accordance with the statement of Hu and Adey (2002) which states that, this test is very useful in measuring students' scientific creativity, although they still need knowledge about certain material to be able to answer each question, so this test is difficult to measure the scientific creativity of students who do not have knowledge about the material. To overcome these requirements, the flipbook on the principle of the Maglev train on electromagnetic induction material has been equipped with materials that are in accordance with the material knowledge being tested so that the risk of a low level of material knowledge and its consequent difficulties in measuring creativity can be reduced.

Flip book on the principle of the Maglev train on electromagnetic induction material to foster motivation to learn and scientific creativity in high school students is in accordance with the KD contained in the syllabus of learning. The material chosen is based on Competency Standards (SK) and Basic Competencies (KD), namely the electromagnetic induction chapter of class XII SMA. Basic competence 3.5 understands electromagnetic induction based on experiments and 4.5 creates simple products using the principle of electromagnetic induction.

From the discussion above, it can be seen that the development of the flip book on the principles of the Maglev train on electromagnetic induction material can be used to foster scientific learning motivation and creativity in high school students by fulfilling indicators of

teaching materials of motivation and scientific creativity. This is consistent with the results of Ramdania's research (2013) The use of Flipbook media can improve students' creative thinking and can also influence student achievement or learning outcomes. In addition, it is in accordance with John's research (2013) which states that, learning to use Flipbook in learning activities improves student learning outcomes, motivation and attitudes.

CONCLUSION

Flip book on the principle of Maglev train is an alternative learning media to foster learning motivation and scientific creativity in learning physics which is used as a medium that can support the creation of human resources in technology literacy in Industry 4.0. Learning by using contextual modules in the form of maglev train as the context of electromagnetic induction learning will increase student learning creativity. Flipbook on the principle of Maglev train is in accordance with point 1 of the indicators to grow motivation, which is to have interesting learning activities to do. The activity is an experiment using an online web simulator. Flip book on the principle of the Maglev train on electromagnetic induction material meets the indicators of scientific creativity point 4, namely the ability to increase the usability and value of the product (product improvement). STEAM analysis in the flipbook is the history of the Maglev train, which is the transformation from a steam train to a diesel-engined train and the discovery of the first magnetic train that has a speed above the speed of an ordinary train, the Maglev Train. This flip book on electromagnetic induction material can be accessed online wherever and whenever as long as there is a computer or android device and a smooth internet connection so that it can be a guide for students in independent learning.

REFERENCES

Aktamis, H & Ergin, O. (2008). The Effect of Scientific Process Skill Education on Students' Scientific Creativity, Science Attitudes and Academic Achievements. *Asia-Pasific Forum on Science Learning and Teaching*, 9(1), p. 1-20.

Almuharomah, F.A., Tantri M., Erawan K. (2019). Pengembangan Modul Fisika STEM Terintegrasi Kearifan Lokal "Beduk" untuk Meningkatkan Kemampuan Berpikir Kreatif Siswa SMP. *Berkala Ilmiah Pendidikan Fisika,* 7 (1), p. 1-10

Arends, R.I. (2012). Learning to Teach (9th ed.). New York: Mc Graw-Hill, Companies, Inc.

Brophy, J., (2004). Motivating Students to Learning, Lawrence Erlbaum Associates, New Jersey.

Ceran, S.A., Gungoren, S.C., & Boyacıoglu, N. (2014). Determination of scientific creativity levels of middle school students and perceptions through their teachers. *European Journal of Research on Education*, p. 47-53.

Christidou, V. (2011). Interest, attitudes and images related to science: Combining students' voices with the voices of school Science, teachers, and popular science. *International Journal of Environmental & Science Education*, 6(2), p. 141-159

Glerum, A., Atasoy B. dan Bierlaire M. (2012). Using semi-open questions to integrate perceptions in choice model. *Journal of Choice Modelling,* 10 (1), p. 1-27

Hu, W. dan Adey P. (2002). A Scientific Creativity Test for Secondary School Students. *International Journal of Science Education,* p. 389-403

Nieveen, N., dan T. Plomp. (2006). An introduction to eductional design research. Netherlands: Institute For Curriculum Development.

Prastuti, M. M. D., Nonoh S. A. dan Sukarmin S. (2018). Pengembangan modul fisika berbasis kontekstual untuk meningkatkan kemampuan berpikir kritis dan kreativitas siswa pada materi kalor dan perpindahannya. *INKUIRI Jurnal Pendidikan IPA* 7(2):168.

Ramadhani, I. Dan Motlan. (2015). Efek Model Pembelajaran Berbasis Proyek Dengan Strategi Think Talk Write Dan Kreativitas Ilmiah Terhadap Hasil Belajar Kognitif Tingkat Tinggi Siswa Sma Pada Pelajaran Fisika. *Jurnal Pendidikan Fisika.* P. 17-24

Sambada, Dwi. (2012). Peranan Kreativitas Siswa Terhadap Kemampuan Memecahkan Masalah Fisika Dalam Pembelajaran Kontekstual. *Jurnal Penelitian Fisika dan Aplikasinya (JPFA,* 2(2), p. 37-47

Santrock, J. W. (2008). Psikologi pendidikan: Edisi kedua. Jakarta: Kencana Prenada Media Group.

Sjukur, S. B. (2012). Pengaruh Blended Learning Terhadap Motivasi Belajar Dan Hasil Belajar Siswa Tingkat SMK. *Jurnal Pendidikan Vokasi*, 2(3), p. 1-11

Sugiyanto. (*2013*). Model-Model pembelajaran Inovatif. Jakarta: Yuma

Wiyoko, Tri, dkk. (2014). Pengembangan Media Pembelajaran Fisika Modul Elektronik Animasi Interaktif Untuk Kelas XI SMA Ditinjau Dari Motivasi Belajar Siswa. *Jurnal Pendidikan Fisika*, 2 (2), p. 11.

SERTIFIKAT

Direktorat Jenderal Penguatan Riset dan Pengembangan,
Kementerian Riset, Teknologi dan Pendidikan Tinggi

RISTEKDIKTI

TERAKREDITASI

Kutipan dari Keputusan Direktur Jenderal Penguatan Riset dan Pengembangan
Kementerian Riset, Teknologi dan Pendidikan Tinggi Republik Indonesia
Nomor: 36/E/KPT/2019, 13 Desember 2019
Peringkat Akreditasi Jurnal Ilmiah Periode VII Tahun 2019

Nama Jurnal Ilmiah

Pancaran Pendidikan

E-ISSN: 2549838X

Penerbit: FKIP-Universitas Jember

Ditetapkan Sebagai Jurnal Ilmiah

TERAKREDITASI PERINGKAT 4

Akreditasi Berlaku Selama 5 (lima) Tahun, Yaitu
Volume 6 Nomor 2 Tahun 2017 sampai Volume 11 Nomor 1 Tahun 2022

Jakarta, 13 Desember 2019
Direktur Jenderal Penguatan Riset dan Pengembangan

DIREKTORAT JENDERAL PENGUATAN RISET DAN PENGEMBANGAN

Dr. Muhammad Dimyati
NIP. 195912171984021001