

**THE EFFECT OF STEM PROJECT-BASED LEARNING ON STUDENTS'
CREATIVITY AND MOTIVATION IN LEARNING HEAT TRANSFER**

RESEARCH PAPER

Submitted as Requirement to Obtain Degree of *Sarjana Pendidikan* in
International Program on Science Education (IPSE) Study Program



Arranged by:

Ulvi Asdi Salikha

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**INTERNATIONAL PROGRAM ON SCIENCE EDUCATION
FACULTY OF MATHEMATICS AND SCIENCE EDUCATION
UNIVERSITAS PENDIDIKAN INDONESIA**

2020

Ulvi Asdi Salikha, 2020

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**APPROVAL FORM OF RESEARCH PAPER
THE EFFECT OF STEM PROJECT-BASED LEARNING ON STUDENTS'
CREATIVITY AND MOTIVATION IN LEARNING HEAT TRANSFER**

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I hereby declare that every respect that is written in a research paper entitled “The Effect of STEM Project-Based Learning on Student’ Creativity and Motivation in Learning Heat Transfer” is genuinely a pure result of my own original idea, effort, research, work, and not a copy or plagiarized of other papers. The opinion or findings of others included in this research have been cited or referred to on the basis of the scientific code of conduct and the ethical sciences that apply to scholarly society. This declaration is created truthfully and consciously, when subsequently it is found an infringement towards scientific ethic, or if there is a claim of any others towards the authenticity of research paper, hence I am willing to responsible and accept academics sanctions correspond to applicable rules.

Bandung, August 2020

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ABSTRACT

Indonesian education system changed several times to adapt to international developments leading to 21st century challenges. In order to respond the 21st century requirements, new models of learning were needed to improve the quality of education. One alternative learning strategy that can be used is the use of STEM project-based learning. The purpose of this study was to investigate the effect of STEM project-based learning on student creativity and motivation in learning heat transfer. The method used in this study was pre-experimental research using one group pretest-posttest design. The method used to collect samples is convenience sampling method. The participants were 26 7th grade junior high school students in Cikancung, Bandung. Based on the five stages of STEM project-based learning implementation, the results show that almost all stages of STEM project-based learning can be completed, except for the correction stage, which cannot be completed due to time limitations. Moreover, students' creativity in this research was assessed from their creative products with the Creative Product Analysis Matrix (CPAM), the result of the student creativity product indicates that the student's level of creativity is at a good level with a percentage of approximately 76.98 %. Furthermore, the use of STEM project-based learning also improves student motivation in learning science. Even though the value of N-gain $\langle g \rangle$ is 0.06, which is considered as low improvement, the statistical test by means of the paired sample t-test shows that there is a significant difference between the motivation of students before and after the STEM project-based learning. Based on these results, it has been shown that STEM project-based learning has a positive effect on student creativity and also improves student motivation. Moreover, STEM project-based learning could also be seen as an innovative model of learning that can be applied to junior high schools.

Keywords: STEM, STEM Project-Based Learning, Students' Creativity, Students' Motivation, Heat Transfer

**PENGARUH *STEM PROJECT-BASED LEARNING* TERHADAP
KREATIVITAS DAN MOTIVASI SISWA PADA PEMBELAJARAN
PERPINDAHAN KALOR**

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ABSTRAK

Sistem pendidikan Indonesia diubah beberapa kali untuk menyesuaikan dengan perkembangan internasional yang mengarah pada tantangan abad ke-21. Untuk menjawab kebutuhan abad ke-21, model-model pembelajaran baru dikembangkan untuk meningkatkan kualitas pendidikan. Salah satu alternatif strategi pembelajaran yang dapat digunakan adalah penggunaan *STEM Project-Based Learning*. Tujuan dari penelitian ini adalah untuk mengetahui pengaruh *STEM Project-Based Learning* terhadap kreativitas dan motivasi siswa dalam pembelajaran perpindahan kalor. Metode yang digunakan dalam penelitian ini adalah penelitian *pre-experimental* dengan menggunakan rancangan *one group pretest-posttest design*. Metode yang digunakan untuk mengumpulkan sampel adalah metode *convenience sampling*. Participants adalah 26 siswa kelas 7 SMP di Cikancung, Bandung. Berdasarkan lima tahapan pelaksanaan *STEM Project-Based Learning*, diperoleh hasil bahwa hampir semua tahapan *STEM Project-Based Learning* dapat dilaksanakan, kecuali pada tahapan *correction* yang tidak dapat diselesaikan karena keterbatasan waktu. Selain itu, kreativitas siswa dalam penelitian ini dinilai dari produk kreatif yang mereka buat dan dinilai menggunakan Creative Product Analysis Matrix (CPAM), hasil dari produk kreativitas siswa menunjukkan bahwa tingkat kreativitas siswa adalah pada tingkat yang baik dengan persentase sekitar 76,98 % . Selain itu, penggunaan *STEM Project-Based Learning* juga dapat meningkatkan motivasi siswa dalam pembelajaran IPA. Meskipun nilai N-gain <g> adalah 0,06 yang dikategorikan sebagai peningkatan yang rendah, namun uji statistik yang menggunakan *paired sample t-test* menunjukkan bahwa terdapat perbedaan yang signifikan antara motivasi siswa sebelum dan sesudah implementasi *STEM Project-Based Learning*. Berdasarkan hasil tersebut, terbukti bahwa pembelajaran menggunakan *STEM Project-Based Learning* berpengaruh positif terhadap kreativitas siswa dan juga meningkatkan motivasi siswa. Selain itu, *STEM Project-Based Learning* juga dapat dilihat sebagai model pembelajaran inovatif yang dapat diterapkan di Sekolah Menengah Pertama (SMP).

Kata Kunci: STEM, *STEM Project-Based Learning*, Kreativitas Siswa, Motivasi Siswa, Perpindahan Kalor

PREFACE

Bismillahirrahmaanirahiim,

Allah SWT is always praised and thankful for His blessing, mercy and compassion so that the writer can complete this research paper entitled "The Effect of STEM Project-Based Learning on Students' Creativity and Motivation in Learning Heat Transfer." *Shalawat* and *Salam* may indeed be dedicated to our Great Prophet Muhammad SAW, all of his family members, relatives and all of the fellow Muslims around the world.

This research paper is the last demands and criteria for all major university educational students to complete their studies and receive *Sarjana Pendidikan*, the similar prerequisite in the International Program on Science Education. In this research paper there are five chapters describing how the effect of STEM project-based learning on the creativity and motivation of students in learning heat transfer is. The research paper is composed of introduction, theory of support, methodology of study, results and discussion of study, conclusion and recommendation.

The perfection belongs to Allah SWT, however, the author realized that this research paper still does have many flaws and needs improvement. The writer expects therefore feedback and recommendations to improve the educational quality in the future were very welcome. Ideally the result presented in this research paper can be useful as a source for reading and a resource for gaining more knowledge for all readers from the educational field.

Bandung, August 2020

Author

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D. DOCUMENTATION

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