

ABSTRACT

Suci Fajrina. 2021. Development of STEMS-Based Project Learning Model to Improve Students' 4C Skills of High School Biology Learning. Dissertation. Postgraduate Program of Universitas Negeri Padang.

The results of preliminary research indicate that students' 4C skills are still low, because biology learning which should emphasize active student involvement by designing STEMS-based projects has not been carried out optimally. In an effort to overcome this problem, a STEMS-based project learning model for biology learning in high school was developed. This study uses the Plomp development design which consists of preliminary research, prototyping phase, and assessment phase. In the preliminary research stage, the analysis of the characteristics of the high school biology learning model, curriculum analysis, analysis of student characteristics, and analysis of learning materials was carried out. In the prototyping phase, a prototype learning model design is carried out which includes syntax, social systems, reaction principles, support systems, instructional impacts and accompaniments which are then tested for validity, practicality, and effectiveness tests. In the assessment phase, field trials are conducted to measure the effectiveness of the developed model. The research data from the validity test was obtained through the validation sheet of the learning model. The research data from the practicality test was obtained through observation sheets on the implementation of learning, questionnaires for teacher and student responses. The research data from the effectiveness test was obtained from the student's 4C skill assessment. The results of the preliminary research stage on the analysis of the characteristics of the high school biology learning model showed that biology learning should emphasize student involvement through project-making activities. Curriculum analysis found that the curriculum that became the basis for high school biology learning was the 2013 curriculum. Material analysis obtained biology learning materials about environmental pollution. The results of the research at the prototyping phase obtained syntax, social systems, reaction principles, support systems, instructional impacts and accompaniments which were designed to follow the steps of a STEMS-based project learning model to improve 4C skills. The results of the assessment phase research on the validity test obtained the average percentage of each aspect in the model book, teacher book, and student book, respectively (3.98); (4, 06); and (4.47) with valid criteria. The results of the analysis of the model practicability test based on the observation of the implementation of learning obtained an average of 4.06, the practicality questionnaire according to the teacher 4.21, and the practicality questionnaire according to the students 4.20 with practical criteria. Furthermore, the results of the effectiveness test through descriptive analysis, are effective for improving students' 4C skills.

ABSTRAK

Suci Fajrina. 2021. Pengembangan model *Project based Learning* berbasis STEMS untuk meningkatkan keterampilan 4C siswa pada pembelajaran biologi di SMA. Disertasi. Pascasarjana Universitas Negeri Padang.

Hasil riset awal menunjukkan masih rendahnya keterampilan 4C pada diri siswa, karena pembelajaran biologi yang seharusnya menekankan keterlibatan aktif siswa dengan merancang proyek berbasis STEMS belum dilakukan secara optimal. Upaya mengatasi masalah ini dikembangkan model *project based learning* berbasis STEMS pada pembelajaran biologi di SMA. Penelitian ini menggunakan desain pengembangan Plomp yang terdiri dari yang terdiri dari *preliminary research*, *prototyping phase*, *assessment phase*. Tahap *preliminary research* dilakukan analisis karakteristik model pembelajaran biologi SMA, analisis kurikulum, analisis karakteristik siswa, dan analisis materi pembelajaran. Tahap *prototyping phase* dilakukan desain prototipe model pembelajaran yang meliputi sintaks, sistem sosial, prinsip reaksi, sistem pendukung, dampak instruksional dan pengiring yang selanjutnya dilakukan uji validitas, praktikalitas, dan uji efektivitas. Tahap *assessment phase* dilakukan uji coba lapangan untuk mengukur tingkat efektivitas model yang dikembangkan. Data penelitian dari uji validitas diperoleh melalui lembar validasi model pembelajaran. Data penelitian dari uji praktikalitas diperoleh melalui lembar observasi keterlaksanaan pembelajaran, angket respon guru dan siswa. Data penelitian dari uji efektivitas diperoleh dari penilaian keterampilan 4C siswa. Hasil penelitian tahap *preliminary research* pada analisis karakteristik model pembelajaran biologi SMA diperoleh bahwa pembelajaran biologi harus menekankan pada keterlibatan siswa melalui aktivitas membuat proyek. Analisis kurikulum diperoleh bahwa kurikulum yang menjadi landasan pembelajaran biologi SMA adalah Kurikulum 2013. Analisis materi diperoleh materi pembelajaran biologi tentang pencemaran lingkungan. Hasil penelitian pada tahap *prototyping phase* diperoleh sintaks, sistem sosial, prinsip reaksi, sistem pendukung, dampak instruksional dan pengiring yang dirancang mengikuti langkah-langkah model *project based learning* berbasis STEMS untuk meningkatkan keterampilan 4C. Hasil penelitian tahap *assessment phase* pada uji validitas diperoleh persentase rata-rata tiap aspek pada buku model, buku guru, dan buku siswa berturut-turut pada adalah (3,98); (4, 06); dan (4,47) dengan kriteria valid. Hasil analisis uji praktikalitas model berdasarkan observasi keterlaksanaan pembelajaran diperoleh rata-rata 4,06, angket kepraktisan model menurut guru 4,21, dan angket kepraktisan menurut siswa 4,20 dengan kriteria praktis. Selanjutnya hasil uji efektivitas melalui analisis deskriptif, efektif untuk meningkatkan keterampilan 4C siswa.