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# The Development of E-Book Based on Project Based Learning on the Plant Anatomy Structure Material

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**ABSTRACT**

Problem solving skills are needed by students to solve problems that arise in everyday life. Innovation in learning is needed so that students can achieve the basic competencies and apply 21st-century skills, in the form of interactive, collaborative learning models. One of the innovations is using the Project-based Learning learning model with the E-book of plant anatomy structures. This study aims to develop an E-book of PjBL-based plant anatomy structures to practice problem-solving skills which are declared valid in terms of theoretical and empirical aspects. The theoretical aspect is viewed from the results of the validity. Empirical aspects in terms of learning outcomes, student responses, and readability. The development model used is 4D. The research was carried out at the UNESA Postgraduate Program in June-August 2020. The target of this research was an online E-book on the structure of plant anatomy based on Project Based Learning which was tested on ten students of Muhammadiyah 1 Gresik senior high school in February 2021. The instruments used were validation sheets, student response sheets, and fry chart sheets. The data were analyzed descriptively quantitatively. The results showed that the PjBL-based E-book of plant anatomical structures was theoretically feasible based on the validation results obtained an categories very valid and empirically feasible based on student learning outcomes (N-gain of moderate categories). Based on this description, a PjBL E-book of plant anatomy structures to train students' problem-solving skills is feasible theoretically and empirically.

## INTRODUCTION

The growth of the globalization era in the 21st century has become a competitive factor for some countries in the world to face the improvement of science and technology. Many countries have seen revolutionary changes with the implementation of science and technology. Technology and data are developing rapidly along with the era development, so that everyone must be able to master the area of life, health, and other problems that are faced by modern citizens. The result of this is the increasing graduate students' competence in the work field. There are many jobs that require a large level of expertise such as critical thinking, reasoning, decision making and skills in dismantling a problem or Problem Solving. 21st-century skills are high-level skills that must be owned by humans to be able to work in the real world and able to face the challenges of the 21st-century (Wijaya et al, 2016). Human Resources in the 21st-century national education paradigm must have several competencies, namely: 1) critical thinking and problem-solving skills 2) communication and collaboration skills 3) the ability to create and update 4) information and communication technology literacy 5) contextual learning ability, and 6) information and media literacy skills (Nugroho, 2015). According to the Ministry of Education and Culture (2017) skills in the 21st century are 4C (Critical thinking, Collaborative, Communicative, and Creative) and integrating HOTS questions.

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