

Implementasi Media Pembelajaran Interaktif Pengenalan Sayuran untuk Anak Usia Dini Menggunakan *Convolutional Neural Network* (Implementation of Interactive Learning Media for Introducing Vegetables to Early Childhood Using Convolutional Neural Network).

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ABSTRACT

This study aims to implement interactive learning media for introducing vegetables to early childhood based on a website using Convolutional Neural Network (CNN). The media is equipped with image classification features, bilingual audio (Indonesian and English), and educational games. The architectures compared are ResNet50 and EfficientNet-B0 with transfer learning on 30 vegetable classes. The training results show that ResNet50 obtained a training accuracy of 95.47% and a validation accuracy of 87.41%, while EfficientNet-B0 obtained a training accuracy of 87.50% and a validation accuracy of 87.22%. Based on these results, optimization was performed on EfficientNet-B0 because it had more stable performance. Optimization was performed through intensive augmentation (rotation, shift, zoom, brightness, channel shift, and horizontal flip), fine-tuning of the last 40 layers, addition of a dense layer of 128 neurons, and a learning rate of 5e-5 with ReduceLROnPlateau. The optimization results increased the validation accuracy to 93.33% and the testing accuracy based on the confusion matrix to 96.48%. Black box testing showed that all features worked well. Evaluation using pre-test and post-test showed an increase in learning outcomes, with the average score rising from 38.43% to 82.41%. Furthermore, UAT obtained a score of 94.67% with a very good category. Thus, this media is declared effective and suitable for use as a learning tool for vegetable recognition for early childhood.

Keywords: *Interactive Learning Media, Early Childhood, Convolutional Neural Network, EfficientNet-B0, Image Classification*