

ABSTRAK

Telah dilakukan *R & D* untuk mengembangkan program perkuliahan Fisika Dasar 2 pada konsep kelistrikan dan kemagnetan berbasis pemecahan masalah. Pengembangan ini dilatar belakangi oleh rendahnya level Model Mental (MM) dan *Mental Modeling Ability* (MMA) calon guru fisika salah satu FKIP di Sulawesi Tengah yang menyebabkan rendahnya kemampuan memecahkan masalah. Tujuan penelitian ini adalah menghasilkan Program Perkuliahan Kelistrikan dan Kemagnetan Berbasis Pemecahan Masalah (PPLM-BPM) yang dapat meningkatkan kemampuan memecahkan masalah melalui perbaikan MM dan peningkatan MMA calon guru fisika. *R & D* yang digunakan adalah model 3D (*define, design, develop*). Pada tahap *define* dilakukan studi lapangan dan studi literatur. Tahap ini menghasilkan karakteristik PPLM-BPM meliputi: ada penanaman pemahaman konsep yang mendalam, melibatkan proses mental, menggunakan strategi *predict-observe-explain* (POE), menggunakan eksperimen pemecahan masalah, menggunakan masalah kaya konteks (*context rich problem*), menggunakan permasalahan isomorfis, dan menggunakan media simulasi virtual. Pada tahap *design* dilakukan perancangan sintak, perangkat, dan tes kemampuan memecahkan masalah yang mengintegrasikan karakteristik PPLM-BPM. Pada tahap *develop* dilakukan penyusunan, validasi, dan ujicoba, serta implementasi terhadap sintak PPLM-PBM, perangkat PPLM-PBM, dan instrumen penelitian. Hasil implementasi PPLM-PBM menunjukkan bahwa pada konteks kelistrikan sebanyak 58% (17 orang) calon guru mengalami perbaikan MM (ke level 2 dan 3), 68% (20 orang) calon guru mengalami peningkatan MMA (ke *moderate* dan *high*), dan 72% (21 orang) calon guru mengalami peningkatan kemampuan memecahkan masalah (ke kelompok sedang dan tinggi) dengan peningkatan (*N-gain*) sebesar 44% (kategori sedang). Pada konteks kemagnetan, sebanyak 86% (25 orang) calon guru mengalami perbaikan MM (ke level 2 dan 3), 89% (26 orang) calon guru mengalami peningkatan MMA (ke *moderate* dan *high*), dan 76% (22 orang) calon guru mengalami peningkatan kemampuan memecahkan masalah (ke kelompok sedang dan tinggi) dengan peningkatan (*N-gain*) sebesar 47% (kategori sedang). Hasil-hasil ini menunjukkan bahwa PPLM-PBM yang dikembangkan dapat memperbaiki MM, meningkatkan MMA, dan meningkatkan kemampuan memecahkan masalah calon guru fisika pada konsep kelistrikan dan kemagnetan.

Kata Kunci: *mental modeling ability*, model mental, kemampuan memecahkan masalah, program perkuliahan

ABSTRACT

R & D has been utilized to develop program of Basic Physics II Course on problem solving based-electricity and magnetism. This development was motivated by the low level of mental model (MM) and mental modeling abilities (MMA) of pre-service physics teachers, in one of the Teacher College in Central Sulawesi, which caused the low ability in terms of solving problems. The aim of the research was to produce on problem solving-based program on electricity and magnetism (PPLM-BPM) which was able to improve problem solving abilities through pre-service teachers' improvement of MM and enhancement of MMA. R & D utilized 3-D model (Define, Design and Develop). The define phase (needs assessments phase) has been utilized via case and literature studies. This phase has produced the characteristics of PPLM-BPM which consisted of: constructing deep conceptual understanding, involving mental process, utilizing predict-observe-explain (POE) strategy, utilizing experimental problem solving, utilizing context rich problem, utilizing isomorphic problems and utilizing virtual simulation multimedia. The design phase has been conducted designing syntax of PPLM-PBM, PPLM-PBM sheets and research instrument that is able to integrate PPLM-BPM characteristics. The develop phase (developing) has been conducted collecting, validating, testing and implementing of PPLM-PBM syntax, PPLM-PBM sheets and research instruments. The implementation results of PPLM-PBM illustrate that electricity context about 58% (17 students) pre-service teachers improved on MM (to level 2 and 3), 68% (20 students) pre-service teachers improved on MMA (to moderate and high) and 72% (21 students) pre-service teachers improved in the problem solving abilities (to moderate and high groups) in which increasing (N-gain) about 44% (moderate category). At the context of magnetism, about 86% (25 students) pre-service teachers improved on MM (to level 2 and 3), 89% (26 students) pre-service teachers improved on MMA (to moderate and high) and 76% (22 students) pre-service teachers improved in the problem solving (to moderate and high groups) in which increasing (N-gain) about 47% (moderate category). These results indicate that PPLM-PBM developed was able to improve students' MM, MMA and problem-solving abilities on the concept of electricity and magnetism.

Keywords: *mental modeling ability, model mental, problem solving abilities, course program*