

PENGEMBANGAN PROGRAM PERKULIAHAN FISIKA SEKOLAH  
DENGAN ARGUMENTASI BERBASIS MULTIPLE REPRESENTASI  
UNTUK MENINGKATKAN KETERAMPILAN BERPIKIR KRITIS  
MAHASISWA CALON GURU

ABSTRAK

Penelitian ini bertujuan mengembangkan program perkuliahan Fisika Sekolah dengan argumentasi berbasis multipel representasi (PFSdAb-MR) untuk meningkatkan keterampilan berpikir kritis (KBK), kemampuan multipel representasi (MR), dan penguasaan konsep mahasiswa calon guru. Program yang dikembangkan berpusat pada mahasiswa dengan tiga ciri pembelajaran yaitu berlatih membangun representasi, pemahaman yang mendalam (*construct deeper understanding*) dan berlatih berpikir kritis melalui argumentasi. Tahapan PFSdAb-MR terdiri dari tahap orientasi dan tahap inti pembelajaran yang mencakup 7 fase. Desain penelitian adalah *mixed methods* dengan *embedded experimental model*. Penelitian dilakukan pada salah satu LPTK di Sumatera Utara. Subjek penelitian adalah 23 mahasiswa pada kelompok eksperimen dan 22 mahasiswa pada kelompok kontrol yang sedang mengikuti mata kuliah Fisika sekolah. Kelompok eksperimen menggunakan PFSdAb-MR, dan kelompok kontrol secara konvensional. Hasil uji program yang dikembangkan menunjukkan bahwa peningkatan KBK, kemampuan MR, dan penguasaan konsep lebih tinggi pada kelompok eksperimen dari kelompok kontrol. Implementasi PFSdAb-MR pada kelompok eksperimen dapat meningkatkan KBK (N-gain = 60,3% kategori sedang, *effect size* = 1,80 dengan kriteria sangat besar); kemampuan MR (N-gain = 62,9% kategori sedang, *effect size* = 2,08 kriteria sangat besar); dan penguasaan konsep (N-gain = 62,2% pada kategori sedang, *effect size* = 2,70 kriteria sangat besar). Peningkatan KBK tertinggi adalah sub-indikator menginterpretasi (N-gain = 67,7%), terendah adalah sub-indikator mengidentifikasi kesimpulan (N-gain = 50,9%). Peningkatan kemampuan MR tertinggi pada representasi grafik (N-gain = 66,1%), terendah pada representasi verbal (N-gain = 56,1%). Peningkatan penguasaan konsep tertinggi pada topik listrik statis (N-gain = 63,9%), terendah pada topik kerja dan energi (N-gain = 60,4%). Mahasiswa dan dosen memberikan tanggapan sangat baik terhadap PFSdAb-MR dan pelaksanaannya. Menurut mahasiswa program yang dikembangkan dapat meningkatkan motivasi belajar dan menumbuhkan kembangkan kompetensi calon guru fisika.

THE DEVELOPMENT OF SCHOOL PHYSICS COURSE PROGRAM USING  
THE REPRESENTATION MULTIPLES BASED ARGUMENTATION TO  
INCREASE THE CRITICAL THINKING SKILLS OF THE STUDENTS  
TEACHER CANDIDATE

ABSTRACT

This research is aimed to develop school Physics course program using multiple representation based argumentation (PFSdAb-MR) to improve the critical thinking skill (KBK), multiple representation (MR) ability, student teacher concept mastery. The program developed is centered on the students with 3 learning characteristics namely practicing to build representation, constructing deeper understanding and practicing the critical thinking through the argumentation. The PFSdAb-MR stage consists of an orientation stage and a core stage of learning covering 7 phases. The research design is a mixed methods utilizing the embedded experimental model. The research was conducted in one of the LPTKs in North Sumatra. The subjects were 23 students in the experimental group and 22 students in the control group who were attending the school physics course. The experimental group used PFSdAb-MR, and the control group used the conventional. The results of the developed program test showed that the improvement of KBK, MR ability, and the concept mastery is higher in the experimental group than those in the control group. The implementation of PFSdAb-MR in the experimental group may increase the KBK (N-gain = 60.3% medium category, effect sized = 1.80 with very large criteria); Ability of MR (N-gain = 62.9% medium category, effect size = 2.08 criteria is very big); and mastery of the concept (N-gain = 62.2% in medium category, effect sized = 2.70 very large criteria.). The highest increase in the KBK is the sub-indicator of interpreting (N-gain = 67.7%), the lowest is the sub-indicator of identifying the conclusion (N-gain = 50.9%). The highest increase in MR ability is on the graphic representation (N-gain = 66.1%), the lowest is on the verbal representation (N-gain = 56.1%). The highest increase of the concept mastery is on the topic of static electricity (N-gain = 63.9%), the lowest is on the topic of work and energy (N-gain = 60.4%). The students and lecturers responded very well to PFSdAb-MR and its implementation. According to the students, the developed program can improve the motivation to learn and grow the competence of the potential physics teachers.