PENERAPAN MODEL *INTERACTIVE CONCEPTUAL INSTRUCTION* BERBANTUAN SIMULASI VIRTUAL UNTUK MEMPERBAIKI MODEL MENTAL SISWA SMA PADA MATERI HUKUM GAS IDEAL

TESIS

Diajukan untuk memenuhi sebagian syarat untuk memperoleh
Gelar Magister Pendidikan Fisika

Oleh

Yani Indriyani
NIM 1503254

PROGRAM STUDI PENDIDIKAN FISIKA
SEKOLAH PASCASARJANA
UNIVERSITAS PENDIDIKAN INDONESIA
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Sebuah tesis yang diajukan untuk memenuhi salah satu syarat memperoleh gelar Magister Pendidikan (M.Pd.) pada Program Studi Pendidikan Fisika, Sekolah Pascasarjana, Universitas Pendidikan Indonesia.

LEMBAR PENGESAHAN

YANI INDRIYANI

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Disetujui dan disahkan oleh pembimbing:

Pembimbing I,

Dr. H. Johar Maknun, M. Si

NIP. 19680308 199303 1 002

Pembimbing II,

Dr. Taufik Ramlan Ramalis, M. Si

NIP. 19590401 198601 1 001

Mengetahui,

Ketua Program Studi Pendidikan Fisika

Sekolah Pascasarjana Universitas Pendidikan Indonesia

Dr. Taufik Ramlan Ramalis, M. Si

NIP. 19590401 198601 1 001

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Yani Indriyani
1503254

Pembimbing I: Dr. Johar Maknun, M.Si.
Pembimbing II: Dr. Taufik Ramlan Ramalis, M. Si

Program Studi Pendidikan Fisika, Sekolah Pascasarjana Universitas Pendidikan Indonesia

Email: yaniindriyani1804@gmail.com

ABSTRAK

Beberapa studi mengenai pengukuran model mental telah dilakukan. Penelitian sebelumnya menunjukkan bahwa siswa memiliki model mental yang keliru mengenai gas ideal. Penelitian ini bertujuan untuk memperoleh gambaran mengenai karakteristik pembelajaran dan perubahan model mental pada materi hukum gas ideal melalui penerapan model *Interactive Conceptual Instruction* berbantuan simulasi virtual. Metode yang digunakan adalah *pre-expreriment* dengan desain *one group pretest-posttest design*. Populasi yang dipilih adalah siswa kelas XI di salah satu SMA swasta di Kota Sukabumi dengan sampel kelas XI IPA 1 dan jumlah sampel sebanyak 31 siswa. Instrumen yang digunakan yaitu lembar observasi keterlaksanaan pembelajaran dan tes pengukuran model mental. Model *Interactive Conceptual Instruction* berbantuan simulasi virtual pada materi hukum gas ideal dalam penelitian ini meliputi 4 fase pembelajaran yaitu: fase fokus konsep, fase penggunaan teks, fase bahan ajar dengan aktivitas meneliti menggunakan simulasi PhET dan simulasi android, serta fase interaksi kelas. Pada fase fokus konsep, siswa melakukan percobaan sederhana. Pada kegiatan ini siswa dilatih untuk menjelaskan fenomena yang diberikan oleh guru. Pada fase penggunaan teks, siswa menggunakan buku paket mereka untuk menemukan hukum fisika apa yang sesuai dengan percobaan sederhana yang telah dilakukan. Pada fase bahan ajar dengan aktivitas meneliti menggunakan simulasi, siswa dilatih untuk memahami gerak partikel dan hubungan antar variabel. Pada fase interaksi kelas, siswa berdiskusi dalam kelompok untuk menemukan fenomena lain yang terkait dengan fenomena yang diberikan oleh guru. Dari hasil analisis data, diperoleh bahwa, penerapan model *Interactive Conceptual Instruction* berbantuan simulasi virtual dapat memperbaiki model mental siswa SMA pada materi hukum gas ideal.

Kata kunci: model *Interactive Conceptual Instruction*, simulasi virtual, model mental, hukum gas ideal

IMPELEMENTATION OF INTERACTIVE CONCEPTUAL INSTRUCTION MODEL WITH VIRTUAL SIMULATION TO IMPROVE MENTAL MODEL OF SENIOR HIGH SCHOOL STUDENTS ON IDEAL GAS LAW

Yani Indriyani
1503254

1st Supervisor: Dr. Johar Maknun, M.Si.
2nd Supervisor: Dr. Taufik Ramlan Ramalis, M. Si

Physics Education Program, Postgraduate School, Indonesia University of Education

Email: yaniindriyani1804@gmail.com

ABSTRACT

Several studies on measuring mental models have been carried out. Previous research shows that students have a wrong mental model about ideal gas. This study aims to obtain an overview of the characteristics of learning and mental model changes in ideal gas law through the impplementation of Interactive Conceptual Instruction models with virtual simulations. The method used was pre-experiment with the design of one group pretest-posttest design. The population chosen was class XI students in one of the senior high schools in Kota Sukabumi with samples of class XI IPA 1 and a total sample of 31 students. The instruments used were observation implementation learning sheets and mental model measurement tests. The Interactive Conceptual Instruction model assisted by virtual simulation on ideal gas law in this study includes 4 learning phases: concept focus phase, text usage phase, research-based teaching material phase using PhET simulation and android simulation, and class interaction phase. In the focus concept phase, students conduct simple experiments. In this activity students are trained to explain the phenomenon given by the teacher. In the text usage phase, students use their textbooks to find out what laws of physics are compatible with the simple experiments that have been carried out. In the phase of research-based teaching materials using simulation, students are trained to understand the motion of particles and the relationships between variables. In the class interaction phase, students discuss in groups to find other phenomena related to the phenomenon given by the teacher. From the results of data analysis, it was found that, the application of the Interactive Conceptual Instruction model with virtual simulations can improve the mental model of high school students in ideal gas law.

Keyword: interactive conceptual instruction model, virtual simulation, mental model, ideal gas law

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