

ABSTRAK

**PENGUATAN PEMAHAMAN KONSEP PESERTA DIDIK SMA
MELALUI PENGEMBANGAN MODEL BENTUK MOLEKUL
ANORGANIK BERBASIS 3D *PRINTER***

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Bentuk molekul merupakan salah satu topik kimia yang sulit dipelajari karena mengandung konsep yang abstrak dan kompleks, sehingga diperlukan alat peraga yang mampu memvisualisasikan konsep tersebut agar mudah dipahami. Saat ini, alat peraga yang tersedia di SMA Negeri 1 Kalasan masih terbatas pada *molymod* organik dan tidak dapat digunakan untuk menggambarkan bentuk molekul anorganik yang dipelajari di kelas X SMA. Penelitian ini bertujuan untuk menghasilkan produk berupa model bentuk molekul anorganik berbasis 3D *Printer*; mengetahui validitas; kepraktisan; dan efektivitasnya; serta menganalisis pemahaman konsep peserta didik selama menggunakan produk. Penelitian ini merupakan *Research and Development* (R&D) yang mengacu pada model ADDIE (Lee & Owens, 2004: 3). Instrumen pendukung penelitian ini berupa lembar validasi produk dan instrumen, angket keterbacaan produk, butir soal *pretest-posttest*, butir soal selama uji coba, lembar observasi pemahaman konsep peserta didik, dan angket respon peserta didik terhadap produk. Penelitian ini melibatkan tiga peserta didik pada uji keterbacaan produk dan 35 peserta didik saat uji coba lapangan. Data penelitian dianalisis menggunakan *SPSS 26*, validitas Aiken's V, *Rasch*, dan deskriptif. Hasil penelitian menunjukkan bahwa (1) produk yang dikembangkan telah sesuai dengan model ADDIE karena kelima tahapan terlaksana secara sistematis; (2) produk yang dikembangkan memiliki validitas sangat tinggi dengan rata-rata persentase sebesar 96,88%; rata-rata persentase kepraktisan sebesar 95,17% yang termasuk kriteria sangat praktis; dan rata-rata persentase efektivitas sebesar 94,69% yang termasuk kriteria sangat efektif; (3) produk yang dikembangkan mampu memperkuat pemahaman konsep peserta didik yang ditunjukkan dengan rata-rata persentase ketercapaian indikator pemahaman konsep selama uji coba sebesar 90,61% dan hasil observasi sebesar 94,69%; yang keduanya termasuk kategori sangat tinggi. Produk dapat digunakan untuk memperkuat pemahaman konsep peserta didik pada topik bentuk molekul.

Kata kunci: 3D *Printer*, bentuk molekul, pemahaman konsep

ABSTRACT**STRENGTHENING CONCEPTUAL UNDERSTANDING OF HIGH SCHOOL STUDENTS THROUGH DEVELOPMENT OF 3D PRINTER-BASED INORGANIC MOLECULAR SHAPE MODEL**

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Molecular shape is one of the difficult chemistry topics to study because it contains abstract and complex concept, so visualization tool is needed which can visualize the concept to be easy to understand. Currently, the visualization tools available at SMA Negeri 1 Kalasan are still limited to organic molymod, so it cannot be used to describe the inorganic molecular shape in grade 10 at senior high school. This research aims to create product in the form of inorganic molecular shape model based on 3D printer; know the validity; practicality; effectiveness of product, and strengthen students' conceptual understanding when using the product. This study is Research and Development (R&D) that based on ADDIE model (Lee & Owens, 2004:3). The supporting instruments for this research are product and instrument validation sheets, product readability questionnaire, pretest-posttest questions, questions during the trial, observation sheet of students' conceptual understanding, and students' response questionnaire to product. This study involved three students on the product readability test and 35 students during field trial. Data analysis were carried out by SPSS 26, Aiken's V, Rasch, and descriptive. The results showed that (1) the product developed was in accordance with the ADDIE model because the five stages were carried out systematically; (2) the product being developed has very high validity with average percentage of 96.88%; the average percentage of practicality is 95.17% which is categorized as very practical; and the average percentage of effectiveness is 94.69% which is categorized as very effective; (3) the product developed is able to strengthen students' conceptual understanding shown on the average percentage of conceptual understanding indicators achievement during the trial was 90.61% and the observation result was 94.69%, both of which belong to very high category. The product can be used to strengthen students' conceptual understanding on the topic of molecular shape.

Keywords: *3D printer, molecular shape, conceptual understanding*