

## ABSTRAK

**Dewi, Luh Putu Sathya (2026)**, Pengembangan E-Modul Biologi Interaktif Berbasis *Collaborative Inquiry Problem Based Learning* (CIPBL) Berorientasi *Socio-Scientific Issues* (SSI) Untuk Meningkatkan *Critical Reasoning* Murid Fase E. Tesis, Pendidikan IPA, Program Pascasarjana, Universitas Pendidikan Ganesha.

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*Kata-kata kunci:* Biologi, *Collaborative Inquiry Problem Based Learning*, *Critical reasoning*, E-modul Interaktif, *Socio-Scientific Issues*.

Kemampuan *critical reasoning* merupakan keterampilan esensial yang perlu dikembangkan pada murid untuk menghadapi permasalahan ilmiah dalam kehidupan nyata secara reflektif dan argumentatif. Namun, kemampuan tersebut masih tergolong rendah, yang ditunjukkan oleh rendahnya kemampuan murid dalam memberikan alasan logis, mengevaluasi informasi, dan mempertimbangkan berbagai sudut pandang sebelum menarik kesimpulan. Selain itu, hasil observasi di SMAs Candimas Pancasari menunjukkan bahwa pemanfaatan teknologi dan penggunaan bahan ajar interaktif dalam pembelajaran biologi belum optimal. Penelitian ini bertujuan untuk mengembangkan e-modul biologi interaktif berbasis *Collaborative Inquiry Problem Based Learning* (CIPBL) berorientasi *Socio-Scientific Issues* (SSI) untuk meningkatkan kemampuan *critical reasoning* murid Fase E. Penelitian ini merupakan penelitian pengembangan (*Research and Development*) yang menggunakan model Borg dan Gall. Data dikumpulkan melalui angket validitas, angket kepraktisan, dan tes uraian kemampuan *critical reasoning*. Uji efektivitas menggunakan *quasi-experimental design* dengan desain *non-equivalent control group design* dan dianalisis menggunakan ANCOVA. Hasil penelitian menunjukkan bahwa e-modul yang dikembangkan memiliki fitur interaktif, sintaks CIPBL yang terintegrasi dengan SSI, serta aktivitas yang melatih kemampuan *critical reasoning*. Hasil uji validitas menunjukkan kategori sangat valid pada aspek materi (KVG = 1,00), bahasa (97,30%), dan media (90,67%). Hasil uji kepraktisan menunjukkan kategori sangat praktis berdasarkan penilaian guru (98,66%), uji perorangan (98,06%), kelompok kecil (92,25%), dan kelompok besar (88,79%). Hasil ANCOVA menunjukkan adanya perbedaan yang signifikan pada kemampuan *critical reasoning* antara kelas eksperimen dan kelas kontrol setelah skor *pretest* dikendalikan ( $p < 0,05$ ), dengan ukuran pengaruh sangat besar (*Partial Eta Squared* = 0,755). Rata-rata skor *posttest* kelas eksperimen (79,23) lebih tinggi dibandingkan kelas kontrol (60,27). Dengan demikian, e-modul biologi interaktif berbasis CIPBL berorientasi SSI dinyatakan valid, praktis, dan efektif untuk meningkatkan kemampuan *critical reasoning* murid Fase E.

## ABSTRACT

**Dewi, Luh Putu Sathya (2026)**, *Development of Interactive Biology E-Modules Based on Collaborative Inquiry Problem Based Learning (CIPBL) Oriented towards Socio-Scientific Issues (SSI) to Improve Critical Reasoning of Phase E Students*. Thesis, Science Education, Postgraduate Program, Universitas Pendidikan Ganesha.

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*Keywords: Biology, Collaborative Inquiry Problem-Based Learning, Interactive E-modul, Critical reasoning, Socio-Scientific Issues.*

*Critical reasoning is an essential skill that needs to be developed in students to enable them to address scientific problems in real-life situations reflectively and argumentatively. However, this ability remains relatively low, as indicated by students' limited ability to provide logical reasoning, evaluate information, and consider multiple perspectives before drawing conclusions. In addition, preliminary observations at SMAs Candimas Pancasari revealed that the utilization of technology and interactive teaching materials in biology learning had not been optimal. Therefore, this study aimed to develop an interactive biology e-module based on Collaborative Inquiry Problem Based Learning (CIPBL) oriented toward Socio-Scientific Issues (SSI) to improve the critical reasoning ability of Phase E students. This study was a Research and Development (R&D) study employing the Borg and Gall model. Data were collected through validity questionnaires, practicality questionnaires, and essay tests measuring critical reasoning ability. The effectiveness of the product was evaluated using a quasi-experimental design with a non-equivalent control group design and analyzed using ANCOVA. The results showed that the developed e-module featured interactive components, CIPBL syntax integrated with SSI, and learning activities designed to foster critical reasoning. The validity test results indicated that the e-module was highly valid in terms of content (CVR = 1.00), language (97.30%), and media aspects (90.67%). The practicality test results showed that the e-module was highly practical based on teacher responses (98.66%), individual trials (98.06%), small-group trials (92.25%), and large-group trials (88.79%). The ANCOVA results revealed a significant difference in critical reasoning ability between the experimental and control groups after controlling for pretest scores ( $p < 0.05$ ), with a very large effect size (Partial Eta Squared = 0.755). The mean posttest score of the experimental group (79.23) was higher than that of the control group (60.27). Therefore, the interactive biology e-module based on CIPBL and oriented toward SSI was found to be valid, practical, and effective in improving the critical reasoning ability of Phase E students.*