CONCEPT OF INTEGRATION OF TUTORIAL MODELS AND DRILL-PRACTICE MODELS ON ONLINE COMPUTER ASSISTED LEARNING

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Research Highlights
This study proposes the concept of combining Tutorial models and Drill-Practice models on interactive learning media in the form of online-based Computer Assisted Learning (CAI). This model is in line with the learning characteristics of the Database Systems course which emphasizes conceptual understanding at the beginning of learning, and unstructured case exercises at the end of learning. The test results show that the proposed model can motivate students to learn independently so that they can improve their mastery of competencies in the Database System. However, it is necessary to provide adequate guidance on CAI applications to be easy to operate. A more effective and interactive design model is also needed if the CAI application is intended to connect to an online system that provides broader learning resources for students so that students can use CAI interactively as an effective learning media used for independent learning.

Research Objectives
Research on the use of CAI-based interactive learning media has been carried out in high schools and universities. The application of CAI is adapted to the characteristics of the field of science taught, such as the use of CAI in the field of science in high schools (Rahman, Ismail, and Nasir, 2014; Suleman, Hussain, Din and Iqbal, 2017), the use of CAI Tutorials on Information Technology learning (Seow, Pan, 2017), and the use of CAI Drill-Practice in learning science (Saprudin, Hamid, 2018). These studies found a link between CAI-based teaching and significant positive effects for improving academic achievement and student retention during learning. The researchers also recommended the use of computer-based learning technology in each learning design that was created. Availability of online technology (internet) is now possible to integrate CAI-based interactive learning media in online-based learning applications. This study proposes an interactive CAI model based on Tutorial and Drill-Practice that is tailored to the characteristics of the field of Database Systems and is connected to global network systems (internet). The concept of connecting to an internet network system allows students to broaden their horizons through interaction with instructors and diverse learning resources when students have difficulty learning independently using interactive learning media.

Methodology
In this work, we use the Research and Development (R & D) method to develop CAI-based interactive learning designs. The R & D method proposed by Gall, Gall, and Borg (2015) was used in the initial stages of research, then followed the stages in the model of learning design development proposed by Dick, Carey, and Carey (2015) as recommended by Gall and Borg. The main steps of the study consist of:
1. Needs analysis through Focus Group Discussions that involve learning designers, study program leaders in universities, college graduates, and college graduates.
2. Development of CAI-based learning design follows the Dick & Carey model. The CAI algorithm proposed is implemented in the seventh step of the Dick and Carey model (developing learning materials).
3. Formative evaluation of model design, consisting of (1) validation by experts (learning design experts, content experts, and media experts / Information Technology), (2) one-on-one evaluation by students.
4. Test the effectiveness of the model, through small group trials. Nine students who have the characteristics of high, medium and low ability are asked to use the system. At the end of the system usage trial, competency mastery tests were conducted. At the same time, students are asked to fill out a questionnaire to get an assessment of the quality of the design of the CAI produced. Test results and student input are used to revise the CAI product design until the product is declared effective.

**Results**
The CAI model based on the proposed combination of Tutorial and Drill integrates learning strategies that emphasize conceptual understanding at the beginning of learning (characteristic of the Tutorial model), and the end offers learning experiences through providing unstructured case studies to develop creativity and test students' abilities (aspects of Drill models and Practice). This concept is aligned with the characteristics of the Database system course, which is largely oriented towards system modeling based on unstructured user needs.
The initial learning session presents particular material sourced from the local server. The content is packaged in the form of an interactive tutorial script in the form of text, images, graphics, photos and images/videos. This session ends Question and Response to test the students' ability to remember and understand the lesson sessions that have just been presented. If students fail to reach the set standard, CAI runs a remedial program until students reach a certain measure of values.
The final learning session is in the form of an unstructured Case Study, but it is still relevant to the material at the beginning of the course, as well as assessing the ability of students to understand and develop the case study. Learning is considered complete when students reach a particular value. If it has not been achieved, CAI guides students to connect to online teaching material servers to enrich students' insights into unstructured cases, and then students return to completing informal case studies until they reach the standard of mastery learning.

**Findings**
The learning and training scenario models offered in the CAI algorithm much motivate students, so that students' understanding of a particular learning theme achieves 90% completeness, consistent with the findings of Thomas et al. (2013) and Suleman et al. (2017). Another finding of this study, some students stated that they still needed instructors (assistants) to get a deeper explanation when they failed to understand certain parts of interactive learning-based material. Interconnection to online systems (internet) still needs further attention so that online resources systems can play a maximum role as an effective companion that assists students in the learning and training process, as in Longmuir's findings (2014).

**References**

