

# Indie: A Software Tool for Building Investigate and Decide Learning Environments

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**Abstract:** We describe a new version of Indie, a software engine for building Investigate and Decide learning environments. Indie is a content-independent tool that constructs web-based GBS learning environments from XML files specifying domain content. In Indie systems, students can run simulated experiments, construct reports arguing for different claims, and submit these reports for critiquing. Indie has been used to construct Corrosion Investigator, a learning environment for engineering undergraduates in the domain of biofilms.

An important skill engineering students need to learn is how to solve problems by running experiments and using the results to support or refute possible diagnoses. We call such activity "Investigate and Decide" (Dobson, 1998). In such an activity, students need to learn how to choose the right experiments to run, interpret the relevance of the results gained, and build a well-supported claim based on the evidence. We have built a second generation version of a software engine and authoring tool called Indie (Dobson, 1998), for creating Investigate and Decide learning environments. Indie is a content-independent Java-based software engine. It reads in XML files that describe the domain knowledge, scenario and outputs a learning environment. Indie engine provides a common interface, including support for a splash screen, a welcoming "challenge" document, a "background" screen where students can browse materials describing the scenario and domain content, a "lab" interface where students can order tests and collect results, and a "report" interface where students can construct arguments for and against possible diagnoses, using the evidence gathered from the tests.

We used Indie to build the Corrosion Investigator application, a learning environment for engineering undergraduates in the domain of biofilms. In the learning environment, students take the role of consultants to help a company determining the cause of pipe corrosion. Students need to make conscious decisions about which tests to run and which test results support the claims they make in order to solve the problem in a timely and economical manner. This requires students fully understand the purposes of the tests and the implication of the test results. To create a specific application, such as Corrosion Investigator, an author creates HTML documents and images for the splash screen, challenge document, and background reference material, and an XML file describing the tests students can perform, the results those tests can produce in general, and will produce in the current scenario, and the possible diagnoses that the student has to argue for and against.

Investigate and Decide is one example of the Goal-based Scenario (GBS) (Schank et al., 1993) framework for learn-by-doing environments. The purpose of GBS is to engage students in active learning (Bransford et al., 1999). Our new version adds much more complex tests, random test result generation, and time and cost calculations. Also, the new Indie supports human critiquing. Since authoring critiquing rules was the hardest part of the previous Indie, offloading this on a human expert makes scenario construction significantly easier.

## References

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