

CASE BASED LEARNING

DEFINITION

Case-based learning (CBL) is an instructional strategy centered on learners' consideration of real-world problems presented as stories set in professional contexts.

IN COMPUTING

CBL in computing education leads to enhancing student motivation and a well-aligned learning environment where practice and theory come together. Additionally, CBL has many benefits, such as the capacity to promote collaboration, critical thinking, and problem-solving skills. It's important to note that CBL can be especially helpful in large courses or as an additional chance to practice skills and develop dispositions before working on larger projects. Compared to project-based learning, this method takes less time and uses fewer resources, giving students the similar benefits of applying computing principles to real-world situations.

CASE BASED LEARNING PEDAGOGICAL APPROACH

Case based learning uses two elements, namely the case and a set of activities related to that case.

A case is a rich narrative that provides detailed information about a situation around which an individual or group must decide or solve a problem.

Cases usually comprise the following:

- ✦ A detailed description of the problem's context, which at minimum includes the current situation and background information
- ✦ A character that plays the central role in the case and has been charged with solving a problem
- ✦ Supporting data, which might take many forms, including data tables, quoted statements from the various actors in the case, supporting documents, images, video, or audio

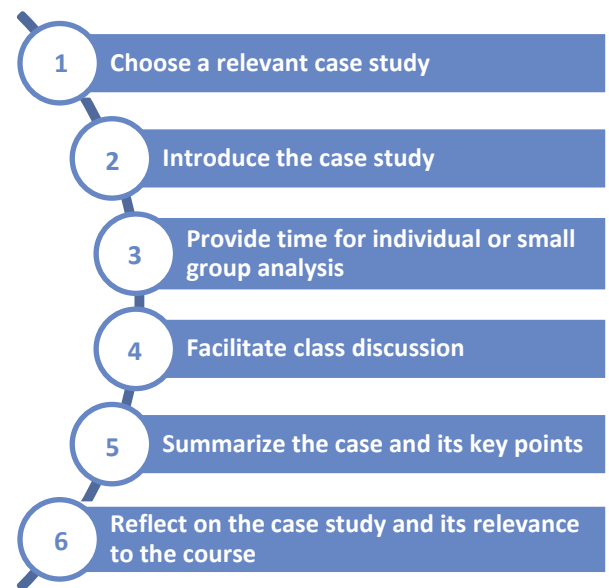
Activities related to case can include:

- ✦ Case Analysis
- ✦ Group Discussion
- ✦ Problem-Solving Exercises
- ✦ Decision-Making
- ✦ Presentations and Debates
- ✦ Reflection and Feedback

Case based learning provides a number of benefits to enhance student learning through "interactive pedagogy" by stimulating critical thinking and problem-solving skills and by creating reasonably realistic replicas of actual situations--which include incomplete information, time constraints, and conflicting goals. The activities listed above align with this approach.

ASSESSMENT APPROACHES

- ✦ Written assignments
- ✦ Group projects
- ✦ Class discussions and presentations
- ✦ Quizzes and exams
- ✦ Reflection assignments



THEORETICAL PERSPECTIVE

Case studies provide students with realistic and complex problem-solving scenarios that require the integration of theory and practice. Case studies are a valuable tool for facilitating constructivist and situated learning approaches. They allow students to engage with the material actively, connect it to their own experiences, and make meaning of it (Reigeluth, 2013).

Moreover, case studies can help students develop critical thinking skills, as they are required to analyze the situation, identify the relevant factors, and make informed decisions based on the available information (Mahdi et al., 2020). Additionally, case studies can be used to encourage the development of professional competencies like communication, teamwork, and problem-solving, which are crucial for success in the computing industry (McAlister-Kizzier, 1999; Kolzow, 2014). Students gain exposure to the complexity of real-world situations and learn how to collaborate successfully with others to find workable solutions by working on activities related to case studies. This prepares them for their future careers and fills the gap between what they learn in school and what industry needs.

EXAMPLES

Freshman Year: Introducing fundamental concepts and principles with real-world examples; guide students to understand the relevance of skills, knowledge, and dispositions described

In freshman year, instructors can use case studies to introduce students to the fundamental concepts and principles of computing. Case studies can be used to provide real-world examples that help students understand the relevance and application of computing technology in various fields. For example, the concept of algorithms can help freshmen understand the relevance and applications of computing technology. Students can see the practical significance of algorithms in real-world scenarios by investigating how they are used in search engines like Google or medical diagnostics in healthcare, highlighting the direct impact of computing in various fields.

Scenario

Professor Li assigns a case study that begins with the story of a consultant company asked to create a mobile app for a nearby nonprofit organization. The case study provides background information on the non-profit and its goals, specifics on the stakeholders who will use the app, their objectives and limitations, and any previously tried solutions. Professor Li's students are instructed to read the case study before working in small groups to create a proposal for a solution that deals with the issue and satisfies the stakeholders' requirements. They are encouraged to develop original and efficient solutions by applying their understanding of computing principles they have learned up to this point. After the groups have presented their recommendations to the class, Professor Li facilitates a whole-class discussion about the advantages and disadvantages of each proposal and the trade-offs involved in choosing one solution over another. Through this activity, the students gain knowledge of computing terms and tools and the critical thinking, problem-solving, and teamwork abilities that are crucial in the field. In this CBL activity, which is being led by Professor Li, assessment may combine formative and summative assessments. Individual reflections, group presentations, and in-class discussions can all be used as part of formative assessments to monitor students' development and provide ongoing feedback. Summative evaluations may involve assessing the final proposals made by the student groups, considering the level of analysis, compliance with stakeholder needs, uniqueness, and feasibility of the proposed solutions. These assessments give students the chance to show how well they comprehend the fundamentals of computing, as well as how well they can think critically, solve problems, and work in a team.

Sophomore Year: Developing more advanced knowledge and skills, problem-solving skills, teamwork

In sophomore year, instructors can use case studies to build on the fundamental concepts and skills introduced in freshman year and help students develop more advanced knowledge and skills in computing.

Scenario

In a sophomore-year software engineering course, Professor Johnson presents a case study that illustrates a scenario in which a team of developers is unable to complete a project on time due to communication and coordination issues. The case study provides the context for the project, the team, and their challenges. Professor Johnson divides the students into groups and assigns a specific role within the team to each group, such as project manager, developer, tester, etc. The student groups then discuss the case study and work together to find solutions to the coordination and communication problems that have been raised. This approach promotes critical thinking, problem-solving, communication, and teamwork while enabling students to apply their knowledge of project management and software development processes in a realistic and practical setting.

The activity includes assessment methods, such as formative and summative assessments, that evaluate students' performance and comprehension. Summative assessments, like written reports and group presentations with Q&A, offer a thorough evaluation of students' analysis, critical thinking, communication skills, and teamwork abilities. Formative assessments, like observations and group presentations, offer ongoing feedback. These evaluations make sure that the learning objectives are met and give the case-based learning activity a chance for reflection and development.

Junior and Senior Years: Applying knowledge and skills to real-world problems and challenges

In junior and senior years, case studies can help students better understand the real-world applications of computing concepts and technologies.

Scenario

In his cybersecurity course, Professor Garcia presents students with a real-world case study about a large corporation that has experienced a data breach, with critical details about the company's security procedures and the type of breach. Groups of students are instructed to create an action plan to address the breach and stop similar incidents in the future. The class discusses the advantages and disadvantages of each plan after each group has presented it to the group. The students better understand the significance of cybersecurity and the challenges associated with securing large corporations as a result of this activity.

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