


Chapter 11

Adaptive Content Planning and Delivery With Assessment Methodology Using Swarm Intelligence on Cloud Computing

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ABSTRACT

University education has been using traditional approaches to impart knowledge. Advancements in technology create a need to change the teaching-learning process's direction to keep up with the current technology pace. Students and teachers should update their skill sets to suit the current needs of technology. Content and syllabus delivery should be planned and delivered to create a more adaptive, self-paced, and personalized learning experience. Evaluation of tests and assignments requires an intelligent system that uses technologies like swarm intelligence and artificial intelligence. Research carried out in this field helps mold the curriculum as per the student's requirements. Swarm intelligence, combined with cloud computing, enables adaptive content planning and delivery. Swarm intelligence techniques and algorithms help design personalized content and delivery. In contrast, cloud infrastructure provides the required computing capability and storage to perform academic tasks on a standard application platform for students and teachers with a cost-effective solution.

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INTRODUCTION

Nature surprises in many ways. Humans have evolved with thinking and intelligence for many years. Humans have associated themselves with the concept of intelligence and the ability to learn from the past. However, natural creatures could develop sophisticated strategies and display a collective behavior that helps achieve complex tasks. Such complex behavior of a group of biological species termed *Swarms* display exciting characteristics. Bees communicate food availability by dancing, and fire ants can build a strong structure such as bridges and crossovers (Karaboga & Akay, 2009). Swarms in nature are incredibly dynamic and decentralized. In general, there is no leader in Swarm guiding the other members in the Swarm to carry out its intended task. Members of Swarm perform its task individually without knowing the collective outcome of the study. The interaction between two members of the Swarm communicates locally (Wong & Looi, 2011).

Formal education, such as classroom training, lectures at universities, and college-specific training, is traditional. Learning in such an environment needs a more extensive infrastructure built explicitly for learning. Traditional approaches are often teacher-driven, having little participation from the students. Students don't engage in dialogue or conversation by asking questions and answering the teacher's questions. Traditional formal education emphasis the teacher by lecturing and giving school homework to be written at home. Sometimes informal learning aids formal learning to increase the knowledge base by the exchange of views and ideas. In the past, informal learning included factory visits, practical learning, or upgrading skill under a skilled worker's guidance. This technological era of a student-centered classroom puts the student's learning responsibility to enable independent creative thinking. Student-centered classrooms help in analytical and emotional growth, making the learning process more fun and interactive. The learning process also makes the student well aware of current trends in the field of interest. Technology has changed the way teachers impart the lessons to the students and change the way students understand and learn a concept (Schmid & Petko, 2019).

Introduction to Learning Management Systems (LMS) enables dispersing learning methodologies across the globe asynchronously. Extensive research is carried out in many higher education institutions to bring new teaching models and learn to update with the current generation's technology. Such tools enable greater autonomy to the teaching faculty. There is a rigidity involved in the existing LMS tools, still dominated by instructor-led training. There is a fair chance of improving the LMS tools making them more student-centric. Students are no longer passive consumers of knowledge, relatively more active in the teaching-learning process. The Internet has enabled a lot of content-sharing activities among the students. Students not only participate in online activities but also create their content. LMS tools have helped groom students towards better learning. The newer generation is enabled with more and more such devices to increase the information sharing and learning curve. Redefining how learning has changed over the years, colleges and universities get provoked to create a diverse and autonomous learning environment.

Informal learning is a method where the teaching happens directly to the participant in the place of presence. A potential interest is generated by a new environment stimulating the learning context, increasing the learner's motivation. Creating surroundings supplement these alternate learning activities. The types of learning based on context-awareness and mobility shown in Figure 1 give us insights about the learners' perspective rather than teachers' perspectives.

Swarm Intelligence (SI) / Swarm Technology (ST), also known as Swarm, is computing inspired by nature. Over the last two decades, many SI-based algorithms have gained popularity due to their flexibil-

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