

# The Art of Web-based Learning: Past Achievements, Present Objectives and Future Strategies

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## ABSTRACT

*The traditional pedagogical teaching approach has been the continuous subject of scrutiny among educationalists worldwide. Recently, the escalating recognition of educational constructivism and progressivism has highlighted the inadequacies of the conventional didactic system in knowledge delivery. The ongoing evolution from the conventional practice of 'chalk-and-talk' teaching toward the innovative execution of 'click-and-tick' learning has led to a further step in the accomplishment of outcome-based, self-directed learning.*

*Exploitation of web-based learning has established a significant advancement in areas where mechanistic and conceptual understanding is critical. Identification of well-defined learning objectives and the appreciation of technological capabilities have initiated the pioneering development of the online learning enhancement, WebCT for BICH172/182, in basic biochemistry.*

*WebCT for BICH172/182 can be regarded as the progeny of an exploratory effort to support conceptual understanding as well as to instigate a dynamic approach in reciprocal learning. Subsequent enthusiastic user acceptance of the preliminary output has encouraged further moves toward the endeavor of formulating a high quality of learning environments with outcome objectives in mind. The recent launching of WebCT for BICH122 represents a second generation of technological development targeted for self-instructional reflective learning.*

*Undoubtedly, the current availability of technological enrichment has contributed a great deal toward the reinforcement of integration between the classical and technological approaches to learning; relentless pursuit must be sustained to encourage active learning and high-level thinking. Such strategies will certainly be the essential criteria to be considered in the continual development of future generations of technological-based learning environments.*

## **Keywords**

Constructivism, reciprocal learning, reflective learning, outcome-based learning

## **INTRODUCTION**

The traditional teaching paradigm has established a strong foundation in tertiary education in which the conventional lecture-based teaching practice continues to be the predominant educational tool at various institutions across the globe. For many, the traditional teaching strategy offers a direct, well-structured means of knowledge transmission within a predestined boundary of the core curriculum. This strategy is regarded as an imperative process for establishing a solid basis through the inheritance of an undeviating heritage of customary principles propounded by connoisseurs within scholastic circles.

Despite the long-standing exploitation of instructor-orientated approach to knowledge delivery, the value of the didactic teaching regime began to be confronted with widespread skepticism when the notion of ‘effective teaching approach’ took on a new perspective. The transition of pedagogical objectives from the classical anticipation of knowledge assimilation and recuperation to the contemporary acquisition of knowledge comprehension and construction signified an important milestone in educational reform. The prevailing recognition of constructivism among educationalists has portrayed a disparate concept in effective teaching and learning strategies in the modern-day educational system.

The adoption of contemporary education strategies and the coincidental acceleration of technological growth have produced a well-defined infrastructure to promote constructive learning. The stratagem of computer-assisted learning (CAL) has made an exemplary contribution in providing an integrated and adaptable academic environment for autonomous, student-centered learning. Understandably, complete reliance on a technology-based approach in knowledge delivery remains controversial. Nevertheless, the exploitation of computer technology has had a significant, irreplaceable impact on the implementation and development of contemporary educational approaches (Yao, 2003).

## **CONTEMPORARY EDUCATION IN BIOCHEMISTRY**

The emergence of contemporary educational theory has created a genuine instructional adaptation across all academic disciplines in tertiary education. This transition is particularly important in areas where knowledge integration, critical thinking, problem solving and life-long learning are implicated and emphasized. In the dynamic ‘world of biochemistry’, the constant addition of content knowledge originating from the continuous explosion of new discoveries, together with the multi-disciplinary demands of the subject, have created an additional tier of challenge in the delivery of biochemical knowledge. The application of a web-based approach is expected to

provide a valuable teaching-learning accompaniment to the continuing existence of the conservative lecture-based method utilized in biochemistry teaching.

### **ACHIEVEMENTS IN WEBCT BICH172/182 DEVELOPMENT**

Construction of WebCT BICH172/182 can be regarded as the prototypic development of a series of web-based enhancement environments specifically targeted at promoting effective teaching and learning in various facets of basic biochemistry. Initiatives underlying the original proposition were derived from the universal principles of convallescening efficiency in knowledge delivery and promoting aptitude in conceptual understanding. Recognition of clearly defined objectives and identification of distinct learning targets have provided a pertinent framework in instructional design leading to the subsequent pioneer development of the innovative educational enrichment in basic biochemistry.

The development of WebCT BICH172/182 is a major step toward the application of web-based technology as a supplementary resource in conventional teaching. The promotion of facilitative learning in support of conceptual understanding of basic biochemical laboratory techniques was the ultimate goal behind its development. The apparent success of WebCT BICH 172/182 in the facilitation of concept attainment, as the target users commented, has greatly encouraged the planning and preparation of a series of successive on-line enhancement systems targeted at other aspects of the curriculum. Furthermore, the availability of an effective communication platform as provided by WebCT BICH172/182 has, inadvertently, revealed considerable potential for the promotion of reciprocal learning (Ho et. al., 2001)

### **OBJECTIVES IN WEBCT BICH122 DEVELOPMENT**

One of the main problems in teaching and learning modern biochemistry is the ongoing discovery and dynamic transformation of content knowledge. This emerging trend has brought about the dilemma of information overflow in which an immense amount of information is embedded within an enormous number of biochemical pathways. The complexity of each individual pathway as well as the intricate relationships among them often generates a feeling of bewilderment in undergraduate students.

In response to a consciousness of the above predicament, construction of a new on-line enrichment program was contemplated. With the clearly defined goal of promoting and enhancing a broad perception of inter-related biochemical processes essential in the learning of biochemistry, multimedia technology and interactive animations were extensively utilized to emphasize the dynamic nature of biochemical processes.

The ultimate goal of WebCT BICH122 was to instigate a highly interactive, user-friendly environment for straightforward navigation through the concise layout of individual biochemical pathways and at the same time appreciate the 'macroscopic' scheme of biochemical systems. With the use of sophisticated navigation tools and the flexibility provided by the 'multi-entry' points in the enhancement program, WebCT

BICH122 could be regarded as an innovation in support of self-instructional, reflective learning.

## **STRATEGIES IN WEBCT BICH121 DEVELOPMENT**

With the rapid expansion in biological knowledge and the inevitable necessity of studying biological processes at microscopic levels, biochemistry has become an essential component in all areas of biological science. The universal goals of molecular characterization and elucidation of structure-function relationships for biomolecules underlie the important role of biochemistry across other academic disciplines.

The major pedagogical problems associated with molecular characterization are the difficulty in initiating an effective transfer of knowledge from the instructor's perspective as well as in developing an appropriate spatial feeling required for the perception of molecular structures in target learners. With the identification of such complications, a strategic plan for the construction of the WebCT BICH121 interactive enhancement was proposed and put into development.

As in the case of WebCT BICH122, development of WebCT BICH121 involves the use of a multimedia interface and animated graphics to illustrate biomolecules in their simplified forms. Upon completion, this structural component will be further expanded to illustrate the molecular characteristics and structure-function relationships of a selection of biomolecules.

## **CONCLUSION**

The development of web-based enhancement systems has, indeed, offered a wide range of opportunities for further curricular refinement and optimization. Preliminary studies on the correlation between the use of web-based enhancement and academic achievement have suggested a positive correlation. Together with the encouraging commentaries made by the target users, the web-based enhancement system has certainly fulfilled its role in providing a rational and effective supplement to the conventional method of teaching.

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