Introducing LABVIEW to Students has a Positive Impact on their Education

Salame Amr, Ph.D.
Department of Engineering and Technology
Virginia State University,
Petersburg, Virginia 23806
samr@vsu.edu

Abstract

At the Virginia State University, LABVIEW software was introduced to all electronics engineering technology (EET) students without adding additional courses. LABVIEW is an easy-to-use, interactive, graphical programming language that is ideal for engineers and scientists. In Fall 2004, junior level students performed an “Introduction to LABVIEW” exercise designed for Advanced Electronics Laboratory Course. Students performing the exercise obtained the amplitude frequency response of an RC circuit using a manually controlled function generator and a computer-controlled oscilloscope. During spring 2005, one EET senior student improved the LABVIEW to include measurement of phase and have more readable code for measurement and analysis functionality. He also built a complete design for a traffic light controller. In Fall 2005, an introduction to LABVIEW was performed again. The first week was the same as in the fall 2004. In the second week, a presentation focusing on the benefits of LABVIEW was delivered. A comparison of LABVIEW and other programming languages was delivered as well as a demonstration of their enhanced programming skills. More LABVIEW programs were written by students. During spring 2006, three EET senior students designed and built a PID controller. They implemented their design using LABVIEW to include measurement of speed, phase and error for analysis functionality and simulation. It has been a great experience for students to learn LABVIEW and apply in their work.

Introduction

The responsibility of an accredited program in an institution aims to inspire, enhance and sustain teaching research and work related to simulation and design. The major thrust of this work is to enhance the awareness of the LABVIEW software. Facilitating the awareness of ethical dilemmas in the university community is vital. This can be accomplished through a variety of approaches to foundational and introductory tutorials. This paper will promote the study of computer software throughout the curriculum. Additionally, students' experiences in the study and work of their senior project will be advanced through the efforts from the instructor. Faculty is also afforded opportunities for the study and subsequent course improvement. The students will benefit through lectures, tutorials, workshops, and publications. In pursuing its mission, the institution respects the autonomy of the various research work as well as other departmental efforts. It aims to impact the undergraduate, graduate and professional levels of education by sponsoring lectures to stimulate learning more about LABVIEW, providing developmental opportunities for the faculty to become more informed about descriptive computer software, offering a supportive environment in which faculty can explore the simulation and design techniques relative to the classes, laboratories and other settings in which they teach and develop curricular materials that focus on these issues in regards to the mission of university in faculty research and teaching.

The use of computer technology delivery approaches is increasingly becoming a significant competitive factor in higher education. Institutions of higher education adopt new paradigms for assessing the appropriateness of their technology choices. This paper discusses the relationship between alternative delivery approaches and desired outcome skills for adult learning situations. An educational system design is presented and demonstrated with analogous processes maps that have proven useful in coaching and tutoring [1].

To enhance the effectiveness of the educational delivery systems, the relationship between design process structure and learning outcome is studied. This paper suggests that comparing the degree of student interaction with desired outcome skills will facilitate an understanding of the strategic options available to choose from. Using a suitable educational system design, the relationship of the choice of educational delivery approach on learning outcomes gets demonstrated. These approaches represent the types of interaction processes, going from highly standardized processes of interaction to highly interactive. The educational delivery approaches may represent a stage-wise progression of skills, ranging from basic knowledge involving realistic recall to research skills at the top.

The paper describes

- experiences with EET students and their use of the design tool;
- observations of the impact of LABVIEW Software;
- interesting senior project applications and planned future directions.

Description of The Model

Viewed from the educational delivery approach, this system design constructs a form of process environment. These delivery approaches are characterizing a mode of occupying a particular region as determined by the type of communication media chosen and the desired interaction outcome achieved. A trade-off between learning opportunity and production efficiency occurs. The greater the degree of student/teacher interaction, the greater the opportunity for learning and the richer the quality of the learning experience. The less the degree of student/teacher interaction is the weaker the opportunity for production efficiency and consistency in delivery. Other factors, which play a role in influencing the nature of the interaction, include media richness and collective case study presence. Media richness refers to a medium's capability to convey certain types of information, including immediate feedback, multiple cues, language variety, and personal focus.

As individuals progress from one skills level to the next, qualitative changes occur in the nature of the learning tasks involved. Problem solving becomes more sophisticated, conceptualization more abstract, and the student assumes progressively more responsibility for the learning process. Educational psychologists have long recognized the usefulness of classifying learning outcomes as an aid to curriculum design and standard choice [2]; [3].

The value of the educational system design is that it forces educators to think of both student/teacher interaction as well as educational objectives when choosing a particular learning environment. The interaction will determine the communication media, which in turn, will influence the type of process technologies will need to adopt. Each region represents an environment with a unique combination of learning outcome and corresponding process structure to support it. Learning environments represent good fits between process structure and educational objectives. These are followed by vocational training schools, which have historically succeeded in teaching technical and vocational skills using correspondence formats.

Typically, institutions which lose sight of their distinctive competence will lose their comparative advantage; inadvertently migrate to positions which are untenable they will neglect the key variables that ensured their success. Adopting new technologies, institutions need to keep both dimensions of the educational system design in mind to better understand the potential consequences of their choice. The new strategies essentially replicate the current process focus thereby reinforcing what they already do well. They require a shift in positioning with new competitive priorities and a refocusing of their organizational capabilities.

Studying the difficulties experienced by educational institutions in integrating research with the teaching as the functions developed a process showing the relationship between the life cycle phases of their processes. The principle for an institution is to develop a sustainable competitive advantage such that educators have a broad understanding of the process capabilities and how they interact with other parts. The process structure continuum comprised a similar stage-wise progression from work processes to continuous flow processes.

Typically, institutions are noticed as they introduce more integrated process technologies to respond to the changing needs of the programs they support. However, an approach may deliberately choose a style away from the common in order to differentiate itself from its traditions. An institution that allows itself to drift away from the common without understanding the likely implications might find itself in trouble. This is not the case with the computer technology approach, which became too capital intensive for a market that couldn't support stable, high-volume production. This may make it more vulnerable to hit unless it succeeds in achieving focus and exploit the advantages of such a situation.

The two-dimensional point of view permits an educational institution to be more precise about what its distinctive competence really is and helps it avoid being preoccupied with the recruiting aspects alone. Strategic focus is achieved by a combination of both processes as well as effect focus. Furthermore, the process can aid educators in identifying the respective competitive research priorities and teaching styles that are relevant when making delivery choices. The computer technology approach has also proven to be particularly useful for helping position individual programs to meet certain requirements and for identifying providers who are most capable of meeting a department's needs.

Several authors have explored the relationship between process structures and endorse competitiveness in service engineering. The degree of complexity of the delivery approach is measured and compared by the number and difficulty of the steps involved with the degree of divergence, which is the amount of discretion or freedom permitted to customize each process step. A classification scheme for process design by using the concept of divergence, the object toward which the educational activity is directed, and the degree of customer contact.

A particularly useful system design was developed here, linking encouragement and innovation variables. The top of the matrix shows the degree of student/teacher contact, classified as buffered, permeable, and reactive. The left side of the matrix shows that the greater the amount of contact, the greater the skill opportunity; the right side shows the negative impact on creation efficiency as the student applies more influence on the operation. Various ways in which teaching styles can be delivered are explained. At one extreme, there is no personal interaction, contact being by mail, while at the other extreme, the student experiences one-to-one contact with the advantage resource and extensively influences the outcome of the approach.

The system design has both operational and strategic uses. The type and level of student skills is likely to vary as contact increases. Other operational implications include the focus of procedures, which shifts from demand supervision and the precise description of procedures to capacity supervision and the ability to identify appropriate student diversity. The types of technological innovations employed are also influenced by the degree of contact. Increasing operation lay out are emphasized at the lower level course such that technologies support student interaction as computer-aided analytical tools. The system design enables a systematic integration of operations and support approach.

In this paper we suggest that comparing the degree of student/teacher interaction with desired outcome skills will facilitate an understanding of the strategic options available to educators as they choose delivery options [2]. Using an educational system design, the relationship of the choice of educational delivery approach on learning outcomes is described. The columns represent the types of interaction processes, going from highly standardized processes allowing little or no interaction to highly interactive, one-to-one processes on the right-hand side. The rows represent a stage-wise progression of skills, ranging from basic knowledge involving realistic recall to research skills at the top.

The horizontal axis represents the process dimension while the vertical axis represents the outcome or product dimension. We are able to characterize a given delivery mode as occupying a particular region as determined by the type of computer software chosen and the desired learning outcome achieved.

Distinctions along the horizontal dimension may be made in a variety of ways. For example, the degree of student/teacher contact can be measured as the proportion of total learning time by student in the presence (physical or electronic) of the teacher. The total student learning time is the denominator and teacher contact time belongs in the numerator. Of course, the quality of the interaction as we move horizontally is not simply proportional to the amount of time spent in synchronous interaction between student and teacher. In certain learning situations, asynchronous interaction can contribute to the quality of the learning experience and even reduce the need for synchronous interaction. The four classifications of interaction used in our educational system design are distinguished.

The vertical dimension depicts a stage-wise progression of outcome skills to be achieved in student's learning situations. As students progress from one skills level to the next, qualitative changes occur in the nature of the learning tasks involved. Problem solving becomes more sophisticated, conceptualization more abstract, and the student assumes progressively more responsibility for the learning process. Educational psychologists have long recognized the usefulness of classifying learning outcomes as an aid to curriculum design and media choice [1], [2]. Bloom's hierarchy lists six educational objectives in the cognitive domain: knowledge, comprehension, application, analysis, synthesis, and evaluation. Gagne includes the affective and psychomotor domains in describing five varieties of capability: intellectual skills, cognitive strategies, verbal information, motor skills, and attitudes. While we use somewhat different terms to define our four categories, they are generally consistent in scope and ranking with previously established classifications.

The value of the educational system design is that it forces educators to think of both student/teacher contact as well as educational objectives when choosing a particular learning environment. Our premise is that the type of student/teacher contact chosen will determine the communication media, which in turn, will influence the type of computer technologies an educational institution will need to adopt. Furthermore, the greater the degree of student/teacher interaction, the greater the opportunities for learning. Each region represents an environment with a unique combination of learning outcome and corresponding process structure to support it. Learning environments along the diagonal represent good fits between process structure and educational objectives.

As new technologies become more widely used and accepted, the basis for competition is changing and educators need to consider process technology as a key strategic variable in addition to computer software choice. There should be an arrangement for the students to make comments and give suggestions on the layout of the design. Access to a Digital Library should be given to the students, [4].

Institutions which lose sight of their distinctive competence will drift back to the diagonal and lose their comparative advantage, inadvertently migrate to positions on the matrix which are untenable, such as being tightly focused in the upper left-hand or lower right-hand corners, or they will neglect the key variables that ensured their success off the diagonal. Adopting new technologies, universities need to keep both dimensions of the educational system design matrix in mind to better understand the potential consequences of their choice. The new technologies essentially replicate the current product-process focus thereby reinforcing what they already do well, or they require a shift in positioning with new competitive priorities and a refocusing of their organizational capabilities. This may come from an understanding of the relationship among software choice and desired learning outcomes, and their impact on organizational capabilities.

Conclusion

Obtaining a quality education as a working professional has been extremely difficult. The constraints and inflexible demands of the research and teaching requirement, frequent move away from homework and difficulty in accessing resources has made the quest for additional professional skills for an advanced technical degree. This approach was to extend the reach and effectiveness of engineering education through the use of advance computing and communication technologies. The ambition of this work was to demonstrate electronic connectivity for technology-based educational delivery. The activities are constructed to produce a common framework for instructional web sites and support the videoconferencing system. Introducing computer software to Students had a positive impact on their education and technical skills.

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Biographies

SALAME M. AMR is Assistant Professor of Electronics Engineering & Technology at Virginia State University. He joined the faculty at Virginia State University in August 2002, after completing his Ph.D. at New Mexico State University. He teaches a variety of courses for the department of Engineering and Technology. His research work is exhibited broadly.