
Continuous Course Improvement, Enhancements, & Modifications: Control & Tracking

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Abstract

The WebBSIT, a Bachelor of Science in Information Technology, is a fully online degree offered through a consortium of five University System of Georgia institutions. This paper begins by describing the evolution of the WebBSIT and the results of an insightful vision that placed an emphasis on developing a curriculum rather than just a set of discrete courses. To maintain, grow, and improve the program, analysis of data must lead to planned curriculum revision. The balance of this paper develops an innovative process that employs roles and business rules to define a change management system for continuous improvement, enhancement, and modification of an online curriculum.

Background of the Georgia WebBSIT

The Georgia Bachelor of Science in Information Technology (BSIT) degree program (G. WebBSIT, 2009) is offered collaboratively by five University System of Georgia (USG) institutions: Armstrong Atlantic State University; Clayton State University; Columbus State University; Georgia Southern University; and Southern Polytechnic State University.

The degree requires that students be admitted to one of the five collaborating institutions. The WebBSIT offers the Information Technology core curriculum (Area F) and all upper division courses entirely online. The program assumes that students have completed most of their general education courses (Areas A - E).

The Georgia WebBSIT program has two primary purposes. The first purpose is to produce IT graduates with the knowledge, skills, and abilities to meet the needs of Georgia employers. The second, to provide access to a BSIT education for Georgia citizens who would otherwise be unable to pursue such training within the State (WebBSIT, 2004). The program combines the resources and expertise of five USG institutions and strongly embodies these facets of the USG mission.

Collaborative Curriculum and Course Development

The WebBSIT Program is the product of a collaborative development process leading to a program that nimbly responds to changes in IT education and training. The process was similar to that defined by Chapman and Nicolet (2003) for scalable, rapid course development. Emerging curricular and accreditation standards were referenced: The Association for Computing Machinery (ACM) (Special Interest Group for Information Technology Education SIGITE, 2009); (National Workforce Center for Emerging Technologies, 2006; NWCET, 2009). The collaboration began in May 2002. The Board of Regents approved the program in 2004 and the first courses were offered that fall.

The Challenge

A consortium program is indirectly impacted by change at any one of the member institutions as board members and faculty change. Emerging technologies may directly impact program outcomes and require modifications to course content. These challenges are not unique to the WebBSIT however they are compounded by the online delivery of the program. New technologies to enhance asynchronous and synchronous delivery of course content and the evolution of learning management systems create an additional burden.

Maintaining collaborative ties across institutional boundaries and encouraging content experts' participation in the program must be priorities while developing plans for the future. Setting clear guidelines based on past success can help.

The WebBSIT Operating Board is responsible for oversight of the curriculum, modification of program outcomes, and approval of course learning objectives that support program outcomes. The most pressing task for the future is creating a sustainable system for continuous program improvement

Developing a Curriculum

As one of its first activities, the WebBSIT Operating Board developed a set of program outcomes to guide the development of courses. Concurrently, the ACM's Special Interest Group for Information Technology Education (SIGITE) was formed with the goal of developing accreditation criteria for baccalaureate programs in Information Technology. The Computing Accreditation Commission (CAC) of ABET accredits Computer Science, Information Systems and Information Technology programs. Standards

for computing disciplines contain statements of intent with greater focus on outcomes, assessment and continuous improvement (Lidtke, Leone, & Reichgelt, 2004). Some members of the WebBSIT Operating Board also worked with SIGITE (Price, Reichgelt, Hamilton, & Leone, 2005) and the synergy between the two groups produced a set of program outcomes for Information Technology which was adopted by the WebBSIT. See Table 1.

Table 1

Program Outcomes

1	Use and apply current IT discipline-related concepts and practices.
2	Identify and analyze organizational and individual problems or opportunities in the IT realm and define requirements for addressing them when an IT solution is appropriate.
3	Design and develop effective, IT-based solutions and integrate them into the user environment.
4	Create and implement effective project plans.
5	Identify and investigate current and emerging technologies and assess their applicability to address individual and organizational needs.
6	Analyze the impact of technology on individuals, organizations, and society.
7	Collaborate in teams to accomplish common goals.
8	Communicate effectively and efficiently.
9	Recognize the qualities necessary to succeed in a professional environment.

Early on, the WebBSIT Operating Board developed a process for mapping program outcomes to courses using Bloom’s taxonomy of the cognitive domain (Bloom, 1956). Three levels of mastery were developed based on Bloom: developing level of mastery, mature level of mastery, and proficient level of mastery. See Table 2.

Table 2

Levels of Mastery

Level	Definition
Developing	Demonstrates an emerging level of knowledge and skills; can perform beginning skills and shows potential to perform independently.
Mature	Demonstrates a refined level of comprehension; is able to apply appropriate skills and perform both independently and as a team member
Proficient	Demonstrates a superior level of knowledge and understanding; integrates and applies skills across multiple areas both independently and as a team member.

The WebBSIT Operating Board’s focus was the development of an integrated curriculum rather than a set of discrete courses. With program outcomes in hand and a guide to required levels of mastery, the Operating Board began the process of defining elements of the curriculum. First, topic areas were identified based on program outcomes: Professional Development, Information Systems, Database, Programming, Web and Multimedia, Security, and IT Strategy. For each of these topic areas, the Operating Board defined a set of courses and mapped program outcomes and levels of mastery to each course. See Appendix 1.

The Operating Board contracted with content experts to develop each course. The course developer received the course title, a rough description, and the list of program outcomes with corresponding desired levels of mastery. The course developer then created an outline of the course and mapped a set of course objectives to each program outcome. The Operating Board, after some give and take with the developer, approved the design. The course developer then completed the course by creating appropriate content and assessments. Instructional designers helped to massage the content of each course into a standard WebCT Vista course shell.

A given assessment may address many objectives and an objective may be addressed by many assessments. To effectively map this many-to-many relationship, assessments may be viewed as having one or more elements. Each element is designed to measure one or more course objectives. A given course objective might be assessed by more than one element. Course objectives support specific program outcomes and should be measured against a specific mastery level. For each objective-element pair, a corresponding rubric should be recorded (Booth, Preston, & Qu, 2007). The generic relationships are clarified by Table 3. Rubrics are an essential, though often neglected, tool that 1) explicitly define which objectives are being assessed; 2) determine expected performance level; and 3) allows students to focus their efforts on meeting the expectations of the assessment.

Table 3

Assessment Elements to Course Objectives

Program Outcome Course Objective	Assessment Assessment Element	Level of Mastery Rubric
Program Outcome 1	Assignment 1	Level M
Objective 1a	Element a	Rubric 1a-a
Objective 1b	Element b	Rubric 1b-b
Objective 1c	Element b	Rubric 1c-b
Program Outcome 2		Level D
Objective 2a	Element c	Rubric 2a-c
Objective 2b	Element d	Rubric 2b-d
Objective 2b	Element e	Rubric 2b-e

Now that the WebBSIT curriculum design is complete, there is a desire to shape future curriculum by assessing current curriculum. To provide continuous program improvement, analysis of data must lead to planned curriculum revision. One problem will be documenting that students are assessed on program outcomes mapped to course objectives and that such assessment is used for continuous program improvement. Demonstrating that assessment drives continuous program improvement, closing the loop, is sometimes a difficult job (Maxim, 2004). The difficulty of the job can be compounded by the use of a course management system. The WebBSIT adopted the use of WebCT Vista. While many advantages accrue from such a system, extracting assessment data is not one of them. The advent of Vista 8 falls at an advantageous time for the WebBSIT. Now that the development phase of the new curriculum is coming to a close, the program is entering a maintenance phase. The move to Vista 8 will require some reworking of all the courses, thus providing an ideal opportunity to implement a continuous program improvement process. Thankfully, Vista 8 has new tools to help.

Vista 8 provides a *Goals* tool that allows course objectives (goals) to be recorded. The *Goals* tool can record program outcomes (categories). Goals are organized under categories. Within this structure, content files, assessments and assignments can be associated with one or more goals.

Vista 8 provides a *Grading Forms* tool to identify performance criteria for discussion topics and assignments. A grading form is analogous to a rubric. Columns in the grade book can be associated with grading forms. However, it does not appear that grading forms can be associated with tests or quizzes.

Maintaining a Curriculum

The WebBSIT is using roles and business rules to define a change management system for the collaborative. The collaborative model for course development used by the WebBSIT is the base model for the future management of continuous improvement, enhancement, and modification to the curriculum and courses. Roles for participating parties in curriculum and course development are based on the evolution of existing roles from the collaborative model.

Roles

The responsibility for the oversight of the curriculum and program outcomes is the role of the Operating Board. The Executive Director's role is that of project manager for course development. The Instructional Designer helps to ensure that courses map properly to online pedagogy. The Course Section Instructor role is that of content expert with online teaching expertise.

During curriculum development, the Course Developer/Content Expert was contracted by the Operating Board. The developer provided course learning objectives to support program outcomes, lectures/content, assessments and grading rubrics. Faculty members serving in this role also served as the course instructor when the course was offered for the first time. A developer's status in the program was transitory. In seeking a more permanent role for long term maintenance of courses, the Operating Board is working to define a new role, that of Course Architect. For a summary of curriculum and development roles, see Table 4.

Table 4

Curriculum and Course Development Roles

Role	Responsibilities & Qualifications
Operating Board Member	<ul style="list-style-type: none"> • Develop Business Rules for Course Enhancement • Develop and Enhance the BSIT Curriculum • Review and Update Program Outcomes • Review Course Outcomes and Topics and map to Program Outcomes • Review Recommendations for new course development • Collaborate with the Executive Director and Course Architects
Executive Director	<ul style="list-style-type: none"> • Develop Business Rules for Course Enhancement • VISTA System Administrator • Collaborate with the Operating Board and Course Architects • Instructional Quality Control • Implementation of new course content in collaboration with Course Architects • Maintain and enhance WebBSIT course template and modules that are not course specific
Course Architect (formerly Course Developer/Content Expert)	<ul style="list-style-type: none"> • Collaborate with the Operating Board and Executive Director • Subject Matter Expert and WebBSIT teaching experience • Continuous Course Improvement <ul style="list-style-type: none"> ◦ Solicit input from all instructors who teach sections of the course ◦ Review recommendations of new content modules, proposals for new/alternative assessments, assignments, projects, etc. ◦ Reviews and recommends to the Operating Board new textbook or other supplemental materials for the course ◦ Updates course content for new editions of the textbook or new textbooks selected ◦ Maintains the Program à Course à Content à Assessment à Grade Book mapping for the course ◦ Maintains the instructor notes in each unit of the course ◦ Manage and maintain the course template ◦ Review of student unit feedback surveys ◦ Review of instructor unit feedback surveys ◦ Address Instructor concerns about <ul style="list-style-type: none"> ▪ Errors in the course content ▪ Ideas for course improvement ▪ Identification of issues that may be confusing for the student or the instructor ▪ Useful lessons learned by instructors relating to teaching this specific course which may merit sharing with all instructors
Instructional Designer	<ul style="list-style-type: none"> • Consult with Course Architects and Executive Director • Knowledge of online course design • Knowledge in online course pedagogy • Knowledge of tools and use in VISTA
Course Section Instructor	<ul style="list-style-type: none"> • Subject Matter Expert with Online teaching experience, training in online pedagogy and use of online instructional tools • Course Management and use of materials prepared by others to meet the course learning objectives • Customize Course Section Syllabus, Calendar, Assignment/Assessment schedule, Discussions • Collaborates with the Course Architect to • Identify errors in the course content <ul style="list-style-type: none"> ◦ Develop ideas for course improvement ◦ Identify issues that may be confusing for the student or the instructor ◦ Document lessons learned by instructors relating to teaching this specific course which may merit sharing with all instructors • Develop and recommend new content lessons, assignments, assessment, and projects that support the course learning objectives

Business Rules

The Operating Board and the Executive Director have developed business rules to implement policies and practices integral to the continuous course improvement, enhancements, & modifications process. Some business rules have been reverse engineered using assessment and accreditation reporting and standards. Others have been developed by applying best practices of online course design and experiential successes.

BR#1- Program Template Design: The WebBSIT uses a single program template design for all courses in the curriculum. The program template provides visual and content standards and ease of use for learners and instructors as they move from course to course in the program. Elements in the template are approved by the Operating Board, designed in consultation with instructional design experts and maintained at the program level by the Executive Director.

BR#2 – Program Standard Syllabus: The WebBSIT uses a standard syllabus with pre-defined components and language approved by the Operating Board and maintained by the Executive Director.

BR#3 - Course Template Design: The WebBSIT uses a course template for each course in the curriculum. The course template is managed and maintained by the course architect. The course template provides structure and consistency to the content of the course.

BR#4 - Program Outcomes: The WebBSIT program outcomes are entered in Vista 8 as *Categories* in each course. The entry should include the expected level of mastery for the course. Program outcomes are approved by the Operating Board and maintained in the course template.

BR#5 - Course Learning Objectives: Each course learning objective is entered in Vista 8 as a *Goal* which mapped to the program outcome (*Category*) it is designed to support. Course learning objectives can be modified by the course architect after approval by the Operating Board.

BR#6 - Content Modules: Content modules are mapped to the course learning objectives (*Goals*) they are designed to support. Course content modules must contain 1) unit advance organizer or unit overview page, 2) lessons/lecture notes, 3) faculty/instructor notes, 4) end-of-unit feedback survey for students, and 5) end-of-unit feedback survey for instructors. A content module may contain, where appropriate, 1) PowerPoint presentations which must be enhanced with either audio lecture or instructor notes, 2) end-of-unit assignment with Vista 8 *Grade Form* 3) assessments which must have grading rubrics and an instructor answer key, 4) discussion topics with Vista 8 *Grade Form* and 5) projects, either individual or group, with grading rubric and instructor notes. All graded assessments, assignments, and projects are mapped to the course learning objectives they support and entered in the grade book. The course architect maintains the content modules of the course.

BR#7 – Assessment Data: The course instructor is required to map assessments to course objectives in the grade book and export the course grade book to a spreadsheet at the end of the semester.

BR#8 – Continuous Program Improvement: The Operating Board is required to review the assessment data collected for each course periodically. The goal of the review is to provide timely revisions and updates to the course, to close the feedback loop. The Operating Board should work with the Executive Director and the course architect to document and implement all changes.

Conclusions

The definition of roles and business rules provides a clear demarcation of responsibility and sets a framework for continuous program improvement as the WebBSIT enters the maintenance phase of its life cycle. Vista 8 provides a mechanism for documenting program outcomes, course objectives, assessments and rubrics. This improvement helps to keep all components of a course in the single repository of the course shell. There is some hope that these improvements will allow a course objective-assessment mapping to be included in the grade book allowing essential feedback to be exported in a spreadsheet format for easy evaluation.

The processes of continuous program improvement, enhancement, and quality control depend on feedback from students and instructors and the evaluation of quantitative performance data. Commitment to the process, planning and design of roles and business rules, and implementation using appropriate tools are the keys to success. The WebBSIT collaboration looks forward to offering a quality program as it transitions from its initial development into a mature program.

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Appendix 1
WebBSIT Outcomes Inventory by Course

Developing Level of Mastery	Use and apply current IT discipline-related concepts and practices	Identify/analyze problems/opportunities and define requirements when an IT solution is appropriate	Design and develop effective, IT-based solutions and integrate them into the user environment.	Create and implement effective project plans.	Identify/investigate current & emerging technologies - assess applicability to address needs.	Analyze the impact of technology on individuals, organizations, and society.	Collaborate in teams to accomplish common goals.	Communicate effectively and efficiently.	Recognize the qualities necessary to succeed in a professional Environment
Mature Level of Mastery									
Proficient Level of Mastery									
0: Professional Development									
WBIT2000 The Enterprise and IT	D	D	D	D	D	M		D	D
WBIT3010 Technical Communication		D		D		D		P	D
WBIT4020 Profnl Practice and Ethics	P				D	P			P
WBIT4030 Senior Project-Portfolio	P	P	P	P			P	P	P
1: Systems									
WBIT1100 Intro to IT	D	D	D		D	M	M	M	M
WBIT3110 Systems Analysis	M	M	M	D	D	M	M	M	M
WBIT3111 Project Management	M		M	P			P	P	M
WBIT4112 Systems Acquisition	P	P	P	P	P	P		P	P
WBIT4120 HCI	M	P	M		D	P		D	
2: Database									
WBIT3200 Database Design	M	M	M		D		M	M	M
3: Programming									
WBIT2300 Discrete Math for IT	D	D						D	
WBIT1310 Prog. Problem Solving I	D		D					D	
WBIT2311 Prog. Problem Solving II	M		M					D	
4: Web and Multimedia									
WBIT3400 Intro to Multimedia	M	D	D		D	D		M	
WBIT3410 Web Application Devel.	M		M		M		P	M	M
5: Security									
WBIT3500 Architecture and O.S.	D	M	D		M	D		D	
WBIT3510 Data Comm. Networking	P	M	M		M			D	
WBIT4520 Information Security	P	P	M		M	M		P	M
6: Strategy									
WBIT3600 Intro to E-Commerce	D	D	D		D	M		D	M
WBIT4601 CRM	P	P	M		M	M	M	M	P
WBIT4602 IT Strategy	P	P	P	P	M	M	P	P	P
WBIT4610 IT Policy and Law	P		M		P	P		P	P