

2006-1959: ASSESSING STUDENT COMPREHENSION IN A WINDOWS 2003 SERVER PROJECT THROUGH THE USE OF A PORTFOLIO

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Assessing Student Comprehension in a Windows 2003 Server Project Through the Use of a Portfolio

Abstract

Like many subjects, the teaching of Windows 2003 server can be filled with rich detail and information that can be quickly lost by the student without proper reinforcement. In the past, hands-on instruction of computer servers has been done with step-by-step laboratories. These laboratories act as a “cookbook” for the student as they process each step of the recipe. Students using these “cookbook” methods concentrate more on completing the required steps than actually synthesizing the learned information. This paper discusses the use of portfolios in a Windows 2003 Server project that can enhance student comprehension and retention.

Student portfolios are a collection of evidence, prepared by the student to demonstrate mastery, comprehension, application, and synthesis of a given set of objectives. To create a high quality portfolio, students must organize, synthesize, and clearly describe their achievements and effectively communicate what they have learned.

The server portfolio is constructed and solely managed by the student throughout a given semester. Each student is given a list of server-based objectives they must complete. The student portfolio then must demonstrate strong, adequate or minimum evidence of mastery based on a given rubric. In this way, a student can quickly estimate their learning and possible portfolio grade.

Introduction

The department of Electrical and Computer Engineering Technology (ECET) at Indiana University Purdue University Fort Wayne (IPFW) offers a new degree in Computer Engineering Technology (CPET). This CPET degree provides a core Electrical Engineering Technology background with additional emphasis in digital electronics, microprocessors, computer networking and programming. The degree offers a reduced emphasis in analog circuits and electronics. Students seeking the B.S. degree will also be eligible for a minor in Computer Science. While circuit theory is reduced in the degree, concentration is focused on a sequence of networking course.

These core networking courses include:

- CPET 181 – Computer Operating System Basics
- CPET 281 – Local Area Networking
- CPET 355 – Data Communication
- CPET 364- Network Security
- CPET 384 – Wide Area Networking

The ultimate goal of such a fledgling program is to meet the challenge of accreditation provided by the underlying accrediting agency. ABET, in Engineering Criteria 2000, requires that all engineering programs demonstrate their effectiveness by assessing eleven student learning outcomes. These outcomes include expected engineering related goals such as “an ability to design a system, component or process to meet desired needs,” and the goal to “recognize the need for an ability to engage in life long learning.”

This shift in criteria demonstrates the change from the traditional “Teacher-Centered” education to that of a “Student-Centered” education. This student-centered learning provides the learner with a more active learning environment. This helps to connect the student with what they are learning and how it relates to their own experiences. Ultimately it can make the learning experience conceptually sound and meaningful to the student.

With the focus now on student-centered learning and assessment, tools to better evaluate the processes of student learning in needed. The ECET department of IPFW is frequently looking for better means of assessment. One approach for assessing and documenting student success is through the use of portfolios. Portfolios have been integrated into the CPET Local Area Networking course of the curriculum.

Student Portfolios

Customarily, portfolios have been used as a tool to showcase for artist’s accomplishments. Maintaining a portfolio in the classroom today has been found to have many uses both to the instructor and student. A portfolio created either written or in electronic form contains a student’s work from start to finish that allows the instructor as well as the student, to evaluate the strengths and weaknesses of a project. The contents of such a document can be very diverse and can reflect the students’ creativity. A well defined portfolio can demonstrate student comprehension of the student and serve as an excellent assessment tool.

A student portfolio is a collection of evidence, prepared by the student to demonstrate mastery, comprehension, application, and synthesis of a given set of objectives. To create a high quality portfolio, students must organize, synthesize, and clearly describe their achievements and effectively communicate what they have learned.

Instructional approaches emphasizing the student-centered learning has increased the value of portfolios by better providing an understanding of the “What, Why and How” of the learning process. This has lead to the appreciation of portfolios as an assessment tool for classroom performance. Numerous educators and researchers believe that a portfolio assessment is a better-quality and more true indicator of student progress than the more conventional types of assessment. Furthermore, student portfolios can supplement the learning process without taking away valuable instructional time. Students can also develop a better understanding of the grading process criteria by having a visual reference such as the portfolio and rubric. Motivation to meet the grading criteria increases and the results are a better understanding of the educational process. Students, instructors and possible employers are able to view the progress made over a complete semester or project.

There is no single exact way to develop a portfolio. Portfolios are not meant to include everything a student generates. A clear guideline of what is required with well formed examples is needed so the student can begin to collect quality work. A key element of a sound portfolio is that the student knows how to properly collect, select and reflect their knowledge and experiences. The notion of modern day portfolio has similarity to that of an engineer's laboratory notebook. Focus of such a portfolio is an arrangement and selection of the materials to be included.

Active learners are what students become when they assume ownership of their learning process. The classroom that once was teacher-centered now becomes a student-centered learning environment. Students now take an active role in the decision process of materials they wish to include in their portfolio. The student ultimately becomes the architect of their own academic success and has a finger on the pulse of what is expected.

The Windows Server 2003 Portfolio

Experiments in Windows Server 2003 have always been inclusive to a networking degree. The placement of such study has ranged from complete multiple courses on the subject to just a unit in a particular course. The placements of Windows 2003 Server experiments at our institution have been included as a significant portion of the Local Area Networking Course. The course, which is more software oriented, spends about 10 weeks covering related topics to the Windows 2003 server. While discussion is kept generalized to local area networking topics, some specific discussions of the Windows 2003 server is covered.

In the past, hands-on instruction of computer servers has been done with step-by-step laboratories. These laboratories act as a "cookbook" for the student as they process each step of the recipe. Students using these "cookbook" methods concentrate more on completing the required steps than actually synthesizing the learned information. This is reinforced by the multiple of books that can be purchased on learning a topic in just "12 hours" or "24 hours". Many times this step-by-step method can be time consuming and detract from the instructional time. Another problem on server learning is the amount of time in which the student has predefined laboratory time. At our particular institution, laboratory time is limited. The Local Area Networking course is a three credit hour course offering about 1.5 hours a week laboratory time. Becoming proficient in Windows 2003 Server requires an extensive amount of more time.

The Windows 2003 server portfolio was implemented to better help the student synthesize the information, help manage instructional time more effectively, and produce a better assessment tool for both the student and instructor.

The server portfolio is constructed and solely managed by the student throughout a given semester. Each student is given a list of server-based objectives they must complete (Appendix A). The student portfolio then must demonstrate strong, adequate or minimum evidence of mastery based on a given rubric. In this way, a student can quickly estimate their learning and possible portfolio grade.

The core to the portfolio is the assigned objectives. Each semester a list of 18 objectives are given to the student to master. These objectives pertain to the setup, use, troubleshooting and maintenance of a Windows 2003 server. (The objectives can change from semester to semester.) The goal of the student is to document and demonstrate using a portfolio the knowledge gained on each objective. There is no step-by-step method given to the student. Throughout the semester the instructor introduces each objective and talks briefly on each. A simple demonstration might also be given but the in-depth examination is assigned to the student.

The student is encouraged to collect all information that would help them express the mastery of a topic. They then must synthesize the information by selecting only the material that would be pertinent to their cause. Recording all information would be time consuming and excessive. Finally they are asked to reflect upon each topic. This includes sharing the highs and lows of their learning process. Some of their greatest knowledge gained is through their failures. Ultimately the student produces a high quality portfolio that is well organized, synthesized, and clearly describes their achievements and effectively communicates what they have learned.

Grading Rubric

In general a rubric is a scoring guide used in subjective assessments. A rubric implies that a rule defining the criteria of an assessment system is followed in evaluation. A rubric can be an explicit description of performance characteristics corresponding to a point on a rating scale. A scoring rubric makes explicit expected qualities of expected performance on a rating scale or the definition of a single scoring point on a scale. The use of such a rubric is as important to the student as it is to the instructor doing the assessment. A rubric expresses what is expected from the student and how the instructor assesses the work.

The rubric for assessing the Windows 2003 server project (Appendix B) was developed as a guideline of student assessment. This particular rubric expresses the achievement of letter grades through the mastery of objectives. Each grade letter plateau expresses the number of objectives that the student needs to achieve. Along with the objective the student must show a particular level of competence with supporting evidence. This evidence is shown in one of three levels.

Strong Evidence:	This is a well written, in-depth explanation of the objective. The full implementation of the objective must be demonstrated in a working server environment.
Adequate Evidence:	A written explanation of the objective but lacks in-depth expression; Implementation (or demonstration and explanation of attempt) of the objective.
Minimum Evidence:	A written explanation of the objective but lacks in-depth expression. No implementation of this objective is needed.

The student is allowed to select the grade they wish to achieve. Through the use of the rubric the student can determine what objectives they wish to attempt and the level of evidence they wish to supply. A few objectives always dictate the use of strong evidence. For example, it would be impossible for the student to accomplish a passing grade without showing strong evidence of the server installation. Without the server installation, the other objectives can not be preformed.

Student Assessment

Over the past several years, over 85% of all students have tried to achieve an “A” status in their portfolio. Of course not all of these students achieved an “A”. In most circumstances these students expressed they were trying to show “Strong Evidence” and only demonstrated “Adequate Evidence”. To help combat this type of problem, samples of “Strong”, “Adequate” and “Minimum” evidence examples are supplied to the student. Furthermore, the instructor is willing to view a limited number of student entries in their portfolio prior to submission.

In general, the students have expressed enjoyment in the freedom of generating a document of their own experiences. Each semester a high percentage of students return to reclaim their portfolio. They wish to use the document as a reference in their future computer courses. Furthermore, the reputation of the course is defined by the portfolio. Each semester students enter the course making statements like “This is where we produce the 80 page paper!” They do not yet have the understanding of the differences between a portfolio and a paper. Once they realize that a portfolio is packed with their own experiences woven together throughout a semester most fears seem to disappear.

Conclusion

The use of portfolios has been a proven tool in assessment. Over the past two years, portfolios have been used in the assessment of a Windows 2003 server project. The success of such an implementation has been multifold. The first success has been in the reclaiming of lecture time. The amount of time spent on server demonstrations has dropped allowing for increase of 10% in the time allowed for other lecture material. Student evaluations of the course have improved with many positive statements of knowledge gained through the use of portfolios.

The portfolio, like the engineering notebook, not only helps the student synthesize the information but creates a permanent record of activities. These activities can be later referenced by the student in future computer server courses. The portfolio objective along with the well defined grading rubric provides an effective tool in assessing student comprehension and knowledge.

- [1] Accreditation Board for Engineering Technology, Inc, “Engineering Criteria 2000: Criteria for Accrediting Engineering Programs” 1999
- [2] Richard Upchruch and Judith E. Sims-Knight, “Portfolio Use in Software Engineering Education: An Experience Report,” ASEE/IEEE Frontiers in Education, Boston, MA, 2002
- [3] Scardamalia, M., Bereiter, and Stienbach, R. “Teachability of reflexive processes in written composition,” *Cognitive Science*, 8, 1989
- [4] T. W. Knott, V. K. Lohani, G.V. Loganathan, G. T. Adel, M.L. Wolfe, M. C. Paretti, K. Mallikarjunan, T. M. Wildman, J. A. Muffo, and O. H. Griffin, Jr., “Using Electronic Portfolios in a Large Engineering Program,” Proceedings of the 2005 American Society for Engineering Education Annual Conference & Exposition
- [5] Azzedine Lansari, Akram Al-Rawi, and Faouzi Bouslama “Using Learning Outcomes and e-Portfolios to Assess Student Learning In Information Systems,” Proceedings of the 2005 American Society for Engineering Education Annual Conference & Exposition
- [6] “Definitions of **Rubric** on the Web:,” www.google.com, 2006
- [7] *Hope J. Gibbs* “Student Portfolios: Documenting Success,” www.actoline.org, 2006

Windows 2003 Portfolio – Fall 2005

Due Date: Tuesday December 13th @ 8pm

What are Portfolios?

Student portfolios are a collection of evidence, prepared by the student and evaluated by the faculty member, to demonstrate mastery, comprehension, application, and synthesis of a given set of objectives. To create a high quality portfolio, students must organize, synthesize, and clearly describe their achievements and effectively communicate what they have learned.

Portfolio Course Learning Objectives: (No predefined order)

- 1) Installation and Configuration of 2003 server
- 2) Managing of printers in 2003 server
- 3) Managing Users and Groups for Windows 2003
- 4) Group Policies within 2003 server
- 5) Use of Automated Scripting and Windows Scripting on a Windows 2003 Server
- 6) Installing and Configuring Active Directories in Windows 2003
- 7) Implementing Disk Management and Disk Quotas for Windows 2003
- 8) Implementing Security in a Windows 2003 Server environment
- 9) Troubleshooting and Recovery of a Windows 2003 Server
- 10) Implementing Windows 2003 as a Domain Name Service (DNS)
- 11) Implementing Windows 2003 as a Dynamic Host Configuration Protocol (DHCP)
- 12) Use of roaming and local profiles for clients of a Windows 2003 Server.
- 13) Implementing the Windows Internet Name Service (WINS) on a Windows 2003 Server.
- 14) Performance Monitoring and Tuning on a Windows 2003 Server
- 15) Configuring Shares and Permissions on a Windows 2003 Server
- 16) Using Windows 2003 support tools.
- 17) Configure system rights and permissions (What's the difference?)
- 18) System trusts within Windows 2003

Grading: The overall Grade will be based on demonstrated mastery, comprehension, application, and synthesis of each given objective. Each objective is graded independently based on its given rubric. Professionalism, documentation format and grammatical correctness will also be a factor.

Documentation: The final portfolios should be in an easy to use well organized format of the author's choice. Each section should state the objective and rubric selection the objective is being graded upon.

Presentation: The author should be prepared at date of submission to demonstrate their Windows 2003 implementation to the instructor. This will support the objectives based on the rubric.

Appendix B

**Rubric – Windows 2003 Portfolio
Fall 2005**

Grading Rubric

The overall portfolio is scored as follows as an indication of the extent to which the portfolio indicates that the student has mastered the 18 Windows 2003 objectives listed elsewhere:

Grade:	Rubric:
A	Strong evidence in at least 14 objectives; adequate in other two; Minimal in one. Plus additional topics of choice demonstrating strong evidence.
B ⁺	Strong evidence in at least 14 objectives; adequate in other two; Minimal in one.
B	Strong evidence in 11 objectives; adequate in all others;
C ⁺	Strong evidence in 9 objectives; adequate in three; All others minimal;
C	Strong evidence in 9 objectives; adequate in at least three other;
D ⁺	Adequate evidence in 11 objectives; Minimum Evidence in Three objectives.
D	Adequate evidence in 11 objectives;
F	Adequate evidence in less than 11 objectives;

Strong Evidence:	Well written in-depth explanation of the objective; Full implementation of the objective.
Adequate Evidence:	Written explanation of the objective; Implementation (or explanation of attempt) of the objective.
Minimum Evidence:	Written explanation of the objective;