

William Paterson University
College of Science and Health - Department of Computer Science

Fall 2013 – Spring 2015 Assessment Cycle
Analysis of the Program’s Student Outcome Assessment Data

Program’s Student Outcome: S4: Work effectively as part of a team in a software or hardware project.

ABET’s Related Student Outcomes (d)

Assessment Committee Members: Gilbert Ndjatou (Chair), Bogong Su, Erh-Wen Hu

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A. Analysis of the Assessment Data

For the assessment period Fall 2013 to Spring 2015, this student outcome was assessed in the following three courses: CS3410, CS3500, and CS4800.

In CS3410, 16, 19, 22, and 23 students respectively took the course. With the lowest category being consistently 0%, all students have accomplished project work with an observed and measured team-based collaborative effort that is at least adequate. In three of the four semesters, the mode was at 50 % in the “More than Adequate Ability” category, which indicates not just attainment but proficient group skills and good team coordination. The fourth observation was a disappointment, as the mode shifted to the just adequate category but may provide some room for improvement. As the cause cannot be determined by the observational metrics, we may need to refine the “measuring tools” or the fundamental variables being measured (the latter being the more likely strategy for inquiry).

In CS 3500, we have a most interesting trend of nearly consistent distributions in 3 of the 4 cases. The three consistent cases are Fall 2013, Fall 2014, and Spring 2015, with a distribution of $\frac{1}{4}$, $\frac{1}{2}$, $\frac{1}{4}$, 0. The zero case is at the high-end, which clearly indicates it is the point for improvement.

In CS 4800, we observe in Fall 2013 that 59% fall in the “More than Adequate Ability” category with the high end “High Ability” being most of the remainder. These are quite positive results. An even more pronounced example occurs in the Spring 2015, where we get 55% High Ability and 45% “More than Adequate Ability”. Results like that generally don’t need improvement. The Fall 2014 statistics is more common but still has the mode on the top category. As teamwork is one of the main goals in the second half of the course, students can focus on that more so than in other courses where content-coverage competes. Each has its purpose.

B. Suggestions for Improvement

- In CS3410: grade teamwork by measuring the fundamental observable variables. Evaluate students based on: leadership/taking initiative (including project manage, load sharing / degree of cooperative effort distribution, who did the programming, who presents, who documents ...

This would then serve as a framework for determining exact characteristics of teamwork, allowing for a better understanding of the team dynamics and more precise analysis/assessment. From there, determine what adjustments need to be made to address/improve situations like the last semester's observation.

- In CS3410: to address concerns specified in some of the individual observations, perhaps some project rubrics can specify the expectations of project work and give teams a clearer picture of what constitutes higher quality in project work. That way, then could conduct better teamwork by a more exact perspective of a shared common goal.
- In CS3500, perhaps more case studies and even a rubric can give students a better idea of what constitutes an excellent project from a good project, an adequate, one, or a sub-par one.
- Also in CS 3500, perhaps more close monitoring of the development process may help. Likewise, if better case tools can help, we need to collect evidence of it. Since teamwork is the primary issue here, perhaps some group-ware or software-development/version monitoring software (SCCS, RCS, GitHub ...) is needed; that way, developers in the team coordinate better in modifying code and sharing it with the team as they progress.
- Coordinating teamwork for the project part of the course CS 4800 is a difficult until the second half of the course. The initial phase of 4800 concentrates on Ethics, an area for discussions in groups but not teamwork with a common cause, plan, and schedule. Areas for improvement are:
 - earlier requirement of abstracts (since students procrastinate)
 - earlier requirement of schedules of activities (broken-up into weekly stages)
 - more tightly monitored load balancing between team members (in real time) because we often find out at evaluation and presentation time who "did the work".Instead of grading/punishing it at the end, why not address the problem in progress and adjust student behavior in a corrective rather than punitive action.

C. Improvement Implemented

- In CS 3410:
 1. Instructor provides more time to monitor and help students' topic selection, design and in particular, implementation and debug.
 2. Prevent selecting traffic light control system topic, however some students copy other topics from web and design from previous semesters.
 3. Specify the requirements of written report more clearly.
- In CS 3500:
 1. A rubric has always been used for project evaluation for this course. During the past two semesters (Fall 2016 and Spring 2016), this rubric has been improved to be more project-specific (rather than a general evaluation).
 2. Visual Paradigm and ArgoUML were the two CASE tools that were introduced to the students. In the past two semesters, more time were devoted to CASE tools and explained to the students how CASE tools could help them.

D. List all the “performance level/frequency/percentage” tables and their sources.

a. Faculty Course Assessment Report: CS 3410, Fall 2013

Data Collected: Each student’s level of performance on oral presentation and written report.

Method of Collection: Team work (two students) is required for a digital logic design project and to make an oral presentation and to produce a report on it. He/she then receives a numerical grade on the contents and knowledge of the project presented and a numerical grade on his/her report from the instructor of the course.

Performance Levels	Frequency	Percentage
Some Ability	0	0 %
Adequate Ability	2	13 %
More than Adequate Ability	8	50 %
High Ability	6	38 %

Observations: Most students worked hard and two students completed an excellent project.

b. Faculty Course Assessment Report : CS3410, Spring 2014

Data Collected: Each student’s level of performance on oral presentation and written report.

Method of Collection: Team work (two students) is required for a digital logic design project and to make an oral presentation and to produce a report on it. He/she then receives a numerical grade on the contents and knowledge of the project presented and a numerical grade on his/her report from the instructor of the course.

Performance Levels	Frequency	Percentage
Some Ability	0	0 %
Adequate Ability	4	21 %
More than Adequate Ability	11	58 %
High Ability	4	21 %

Observations:

- 1) Two students completed an excellent project, they designed a 4-bit calculator with functions of addition, subtraction, multiplication and division, implemented on LogicWorks, and ran successfully.
 - 2) Many students copied the design of traffic light control system from internet with minor changes.
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c. Faculty Course Assessment Report: CS 3410, Fall 2014

Data Collected: Each student's level of performance on oral presentation and written report.

Method of Collection: Team work (two students) is required for a digital logic design project and to make an oral presentation and to produce a report on it. He/she then receives a numerical grade on the contents and knowledge of the project presented and a numerical grade on his/her report from the instructor of the course.

Performance Levels	Frequency	Percentage
Some Ability	0	0 %
Adequate Ability	6	27 %
More than Adequate Ability	11	50%
High Ability	5	23 %

Observations:

- 1) Two teams completed excellent projects; one designed a pretty complicated vending machine control system. Another designed a slot machine control system implemented by both LogicWorks, and real hardware chips; run successfully, the hardware implementation will be used as a teaching model for future classes.
 - 2) Some teams have good idea however their detail design and implementation are poor, finally just completed simple designs.
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d. Faculty Course Assessment Report: CS 3410, Spring 2015

Data Collected: Each student's level of performance on oral presentation and written report.

Method of Collection: Team work (two students) is required for a digital logic design project and to make an oral presentation and to produce a report on it. He/she then receives a numerical grade on the contents and knowledge of the project presented and a numerical grade on his/her report from the instructor of the course.

Performance Levels	Frequency	Percentage
Some Ability	0	0%
Adequate Ability	13	57%
More than Adequate Ability	6	26%
High Ability	4	17%

Observations:

- 1) No excellent projects this semester, most teams select easy topics. Two teams' projects have obvious mistakes and they could not find due to incomplete testing.
 - 2) Some teams work very hard and spend many extra hours.
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e. Faculty Course Assessment Report: CS 3500, Fall 2013

Data Collected: Each student's level of performance on participating in the software team project.

Method of Collection: There were 3 interim project reports (requirements – Use Case Models; specifications and design – Class Diagram and relationships, Communication Diagrams; implementation – C++ or Java codes for the classes) and 1 final report. The final report included the revised materials from the 3 interim project reports. The frequency listed below is at the team level.

Performance Levels	Frequency	Percentage
Some Ability (D)	2	28.57%
Adequate Ability (C)	1	42.86%
More than Adequate Ability (B)	2	28.57%
High Ability (A)	0	0%

Observations: Only 5 teams are represented in the table above because 1 team was below the “some ability” level. Overall, the projects were not that impressive.

f. Faculty Course Assessment Report : CS3500, Spring 2014

Data Collected: Each student's level of performance on participating in the software team project.

Method of Collection: There were 3 interim project reports (requirements – Use Case Models; specifications and design – Class Diagram and relationships, Communication Diagrams; implementation – C++ or Java codes for the classes) and 1 final report. The final report included the revised materials from the 3 interim project reports. The frequency listed below is at the team level.

Performance Levels	Frequency	Percentage
Some Ability (D)	1	25%
Adequate Ability (C)	1	25%
More than Adequate Ability (B)	1	25%
High Ability (A)	1	25%

Observations: The team that was put into the “adequate ability” level was very closed to the “more than adequate ability” level. The team in the “high ability” level had done very well in all the phases of the project.

g. Faculty Course Assessment Report: CS 3500, Fall 2014

Data Collected: Each student's level of performance on participating in the software team project.

Method of Collection: There were 3 interim project reports (requirements – Use Case Models; specifications and design – Class Diagram and relationships, Communication Diagrams; implementation – C++ or Java codes for the classes) and 1 final report. The final report included the revised materials from the 3 interim project reports. The frequency listed below is at the team level.

Performance Levels	Frequency	Percentage
Some Ability (D)	2	28.57%
Adequate Ability (C)	3	42.86%
More than Adequate Ability (B)	2	28.57%
High Ability (A)	0	0%

Observations: Overall, the software projects produced were very average. 2 teams put extra efforts and gave more details into the projects.

h. Faculty Course Assessment Report: CS 3500, Spring 2015

Data Collected: Each student's level of performance on participating in the software team project.

Method of Collection: There were 3 interim project reports (requirements – Use Case Models; specifications and design – Class Diagram and relationships, Communication Diagrams; implementation – C++ or Java codes for the classes) and 1 final report. The final report included the revised materials from the 3 interim project reports. The frequency listed below is at the team level.

Performance Levels	Frequency	Percentage
Some Ability (D)	1	25%
Adequate Ability (C)	2	50%
More than Adequate Ability (B)	1	25%
High Ability (A)	0	0%

Observations: Overall, the software projects produced were not as good quality as in the past. Also, the level of details (amount of efforts) in the projects was not very impressive.

i. Faculty Course Assessment Report: CS 4800, Fall 2013

Data Collected: The students were divided into 2 person teams to teach a chapter of an ethics book, not only to teach them ethics and getting them used to speaking in front of a group, but also to see how they worked together if they had a partner.

Method of Collection: Students gave periodic progress reports orally and elaborated then on their distribution of tasks and level of participation of each member of the team. Because they voluntarily chose their team membership and were cohesive teams, they shared efforts and coordinated well. No one was riding on the backs of others. That they in groups chose their topics and genuinely were actively engaged had much to do with this. I thought before the course that I would have to force load distribution but they did it spontaneously.

Performance Levels	Frequency	Percentage
Some Ability	1	5 %
Adequate Ability	2	9 %
More than Adequate Ability	13	59 %
High Ability	6	27 %

Observations: Most of the students took the path of you do that part and I do this part without interfering with each other. They only coordinated well and at several stages, not just putting the slides together. Among popular activities, some were making computer games and some were designing PHP or other web-based applications. A tiny minority did single person projects, one because their work was research into an open problem in permutations groups (which is not likely to induce interest in many CS students but he was working with math faculty) and another because of psychological problems which were not were too resistive to my attempts to resolve or outreach. In general, minimal prodding or supervision effort was required to induce the teamwork.

Personal Note:

This is my first time teaching this course. I personally find it disconcerting to teach a course that lacks a specific subject, a focused logic, particular set of methodologies, problem sets, or some form of knowledge domain. It is unnerving. All this said, my highest ratings that semester resulted from this course, perhaps from making each student own the course and do projects to the limit of their collective imaginations and interests. I am still somewhat reluctant to teach CS4800 again. The unstructured nature is hard to come to terms with; this assessment may indicate a phobia about oblivion or lack of control. On the positive side, the students worked cohesively as integrated team members, as the course intended. However, with no lengthy final exam or dissemination of CS lectures (except for the ethics component), I feel something is amiss. The student experienced professional growth and developed confidence as senior CS students but I am left confused. My best student presented his work at the CS Advisory Board and was lauded for his outstanding performance. Perhaps I need to learn more from what happened as there are lessons here I have not fully comprehended or incorporated them into my axiomatics or mindset.

j. Faculty Course Assessment Report: CS 4800, Fall 2014

Data Collected: The students preferred to work alone in their final projects. However, students were divided into groups of two people to discuss their project ideas and work as a secondary member of the other group. They shared their idea among themselves to improve the projects.

Method of Collection: The students were graded by the professor on how they work as a team.

Performance Levels	Frequency	Percentage
Some Ability	3	21.5 %
Adequate Ability	2	14 %
More than Adequate Ability	4	28.5%
High Ability	5	36 %

Observations: The students liked this idea. They shared a lot of information, coding skills with their partners to improve the projects.

k. Faculty Course Assessment Report: CS 4800, Spring 2015

Data Collected: Students were divided into 2 person teams and collaborated on their research papers and presentations. After the initial presentations based on assigned papers, students were required to identify a research topic of their own choosing within the security/privacy domain. The final output was a 12 to 14 page paper on the research topic including abstract, literature review, results, conclusion and proper academic references. The guidelines for writing the paper were based on a specific template from an academic conference.

Method of Collection: The students were graded by the professor on how they work as a team via weekly discussions with team members on their progress. Final papers were graded by the professor and the presentations were graded by the professor and students.

Performance Levels	Frequency	Percentage
Some Ability	0	0%
Adequate Ability	0	0 %
More than Adequate Ability	5	45%
High Ability	6	55 %

Observations: Most students collaborated very well on the project sharing information on references and critiquing different sections of their papers. The best example of team work was when students worked together to create the slides for the presentation. Only in a small number of instances some team members chose to work more on the research paper and less on speaking during the presentation.
