

Program Outcome Assessment Summary Report 2009/2010 Academic Year

Department of Computer Science
Eastern Washington University

TABLE OF CONTENTS

1.	Summary of Program Outcome Assessment in AY09/10.....	1
2.	Advancement Programming Exam Scores	3
3.	Ethics Essay Scores	6
4.	Senior Project Rubric Scores	7
4.1	Oral Communication.....	7
4.2	Teamwork.....	8
4.3	Technical Performance	9
5.	Course-specific Outcome-related Learning Objectives.....	9

1. Summary of Program Outcome Assessment in AY09/10

The following table summarizes the assessment methods applied to Undergraduate Program Outcomes during the 2009/2010 academic year:

Program Outcome	Assessed Via
a) Students will have the ability to use current techniques, skills, and tools necessary for computing practice.	APE, CSCD 240, CSCD 300, CSCD 320, CSCD 330, CSCD 340, CSCD 350, CSCD 370, CSCD 425
b) Students will recognize the need for, and will have the ability to engage in, continuing professional development.	Senior Project Oral Communication Rubric, CSCD 340
c) Students will have the ability to analyze the local and global impact of computing on individuals, organizations, and society.	Ethics Essay Rubric
d) Students will have the ability to communicate effectively with a range of audiences.	Ethics Essay and Senior Project Oral Communication Rubrics
e) Students will have an understanding of professional, ethical, legal, security, and social issues and responsibilities.	Ethics Essay Rubric
f) Students will have the ability to function effectively on teams to accomplish a common goal.	Senior Project Teamwork Rubric
g) Students will have the ability to design, implement, and evaluate a computer-based system, process, component, or	APE, CSCD 260, CSCD 300, CSCD 320, CSCD 330, CSCD 350, CSCD 360,

Program Outcome	Assessed Via
program to meet desired needs.	CSCD 425, Senior Project Technical Rubric
h) Students will have the ability to analyze a problem and identify and define the computing requirements appropriate to its solution.	APE, CSCD 240, CSCD 260, CSCD 300, CSCD 320, CSCD 340, CSCD 350, Senior Project Technical Rubric
i) Students will have the ability to apply knowledge of computing and mathematics appropriate to the discipline.	APE, CSCD 240, CSCD 260, CSCD 300, CSCD 320, CSCD 330, CSCD 340, CSCD 360, Senior Project Technical Rubric
j) Students will have the ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices.	CSCD 300, CSCD 320, CSCD 360, Senior Project Technical Rubric
k) Students will have the ability to apply design and development principles in the construction of software systems of varying complexity.	CSCD 350, Senior Project Technical Rubric

The following list summarizes recommended and taken actions as a result of these assessments. Department faculty reviewed these actions and recommendations at the Nov 5, 2010 faculty meeting:

1. Outcome related learning objectives and the course description for CSCD 300 were adjusted to correctly reflect the coverage of sorting, linked lists, and trees.
2. It is recommended that students scoring lower than 35% on an APE exam be required to see the department chair, who will discuss the student's scores with the student and make a determination as to whether some corrective action is warranted.
3. It is recommended that Advancement Programming Exam (APE) writers be sensitive to the balance of expectations between implementation and design.
4. It is recommended that students be exposed to a wider variety of example APE styles on the website. The Spring exam has already been posted as an example of an exam with significant design expectations.
5. It is recommended that APE writers be provided feedback on how average scores on their exams compare to overall averages. This will be done at faculty meetings where APE scores are reviewed.
6. It is recommended that we keep track of the number of students who fail to finish, and provide that as feedback to APE writers. This will be done at faculty meetings where APE scores are reviewed.
7. It is recommended that the APE writing guidelines be re-examined for any opportunity to achieve efficiency of exam time without sacrificing the skills that are tested.
8. Committee agrees with CSCD 211 instructor's decision to assign programming assignments more frequently.
9. CSCD 350 in Spring 09, and its assessment, was flawed due to the need for last-minute substitution of a poorly prepared instructor at a time when course content was being modified to introduce additional lab experiences. It is recommended that lab changes to CSCD 350 be carefully monitored and that the course be re-assessed as soon as possible in AY10/11.

10. It is further recommended that CSCD 350 be assessed by rubric in addition to ORLO assessment. A potential difficulty is the flexibility given to the instructor to use either mini-projects or case studies to illustrate software engineering principles. Instructors Steve Simmons and Tom Capaul have agreed to work together to develop appropriate rubrics.
11. Committee agrees with CSCD 425 instructor's decision to redirect time devoted to database history and paradigms towards additional time for fundamentals of SQL and data modeling, and that students be required to complete all laboratory exercises.
12. It is recommended that additional effort be expended to have as many student ethic essays as practical be reviewed by more than one faculty member.
13. It is recommended that ethics instructors be advised to ensure students get practice in looking at ethical dilemmas from multiple points of view and in discussing alternative resolutions. The instructor expected to teach the remaining ethics courses this year has acknowledged this.

2. Advancement Programming Exam Scores

APE exams were administered during each quarter of the academic year plus summer 2010. APE scores support Program Outcomes (a), (g), (h), and (i).

	This Year	Previous Year
Number of Exams Taken	109	94
Overall Average Exam Score:	75.1%	80.8%
Overall Pass Rate	57.8%	68.1%
Failures on 3rd or Higher Attempt	3.7%	2.1%

Fig 2.1 shows summary data for all four exams for this year and the previous year. Exam section topics were:

(1)	Linked List Manipulation	30%
(2)	Recursion	20%
(3)	Data Abstraction and Class Design	30%
(4)	General Programming	20%

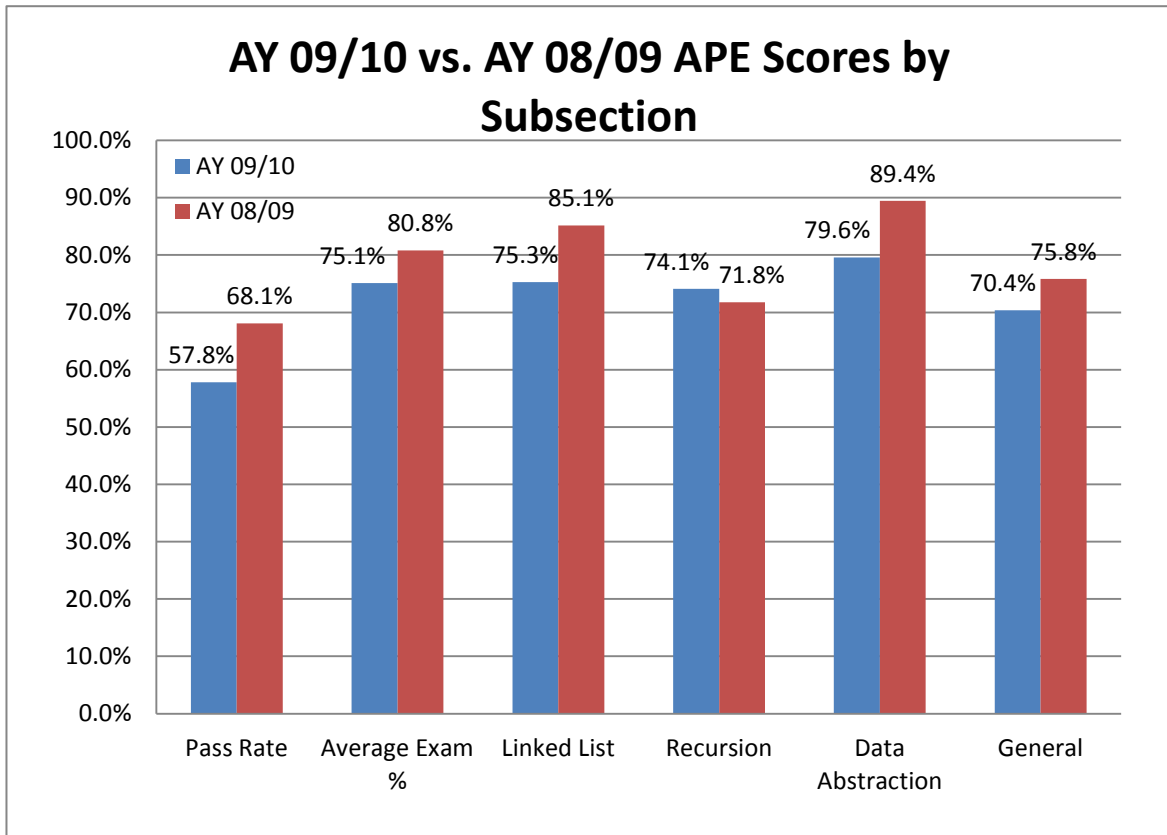


Fig. 2.1 – Summary APE Data by Exam Section

The overall exam scores were about 5 percentage points lower than the previous year. An average performance of 75% is cause for concern as an 80% is required to pass the exam. The overall pass rate was also down significantly, which would be expected from the drop in overall performance. The proportion of exam failures on the third attempt rose only slightly because we are still in the beginning phases (2nd year) of an enrollment surge during AY0910 and exam takers were primarily making their first attempt or second attempts.

A positive note is that subsection scores were much more balanced in AY09/10 than they were in AY08/09, and performance on Recursion (Part 2) was, on average, higher this year than last. We conclude that efforts to expose students to recursive thinking earlier in the curriculum are paying off.

A mitigating factor for lower scores is that the Spring 2010 exam was uncharacteristically difficult, as measured by the average score (70.4%) and the student's time to completion – an extra hour was allowed which nearly all students took advantage of. An examination of the Spring exam shows that the instructions were more conceptual than usual, with more expectation that students work through the design of an appropriate solution and less instruction on what implementation to pursue. The Spring exam was written by a first-time exam writer, and the expectations were perhaps too high for students who have only completed CSCD 211, as at that point in the curriculum the students have focused more on implementation than on design. Several recommendations arise from this:

- It is recommended that exam writers be advised to be sensitive to the balance of expectations between implementation and design.
- It is recommended that students be exposed to a wider variety of example exam styles on the website. The Spring exam has already been posted as an example of an exam with significant design expectations.
- It is recommended that APE writers be provided feedback on how average scores on their exams compare to overall averages.
- It is recommended that we keep track of the number of students who fail to finish, and provide that as feedback to APE writers.
- It is recommended that the APE writing guidelines be re-examined for any opportunity to achieve efficiency of exam time without sacrificing the skills that are tested.

Students typically take this exam after completing CSCD 211. The Winter quarter instructor decided that he should increase the number of programming assignments, with at least one exercise due each week, as opposed to fewer assignments with longer periods to work on them.

In order to gain additional insight we also examined the histogram of overall scores in AY 09/10 vs. AY 08/09:

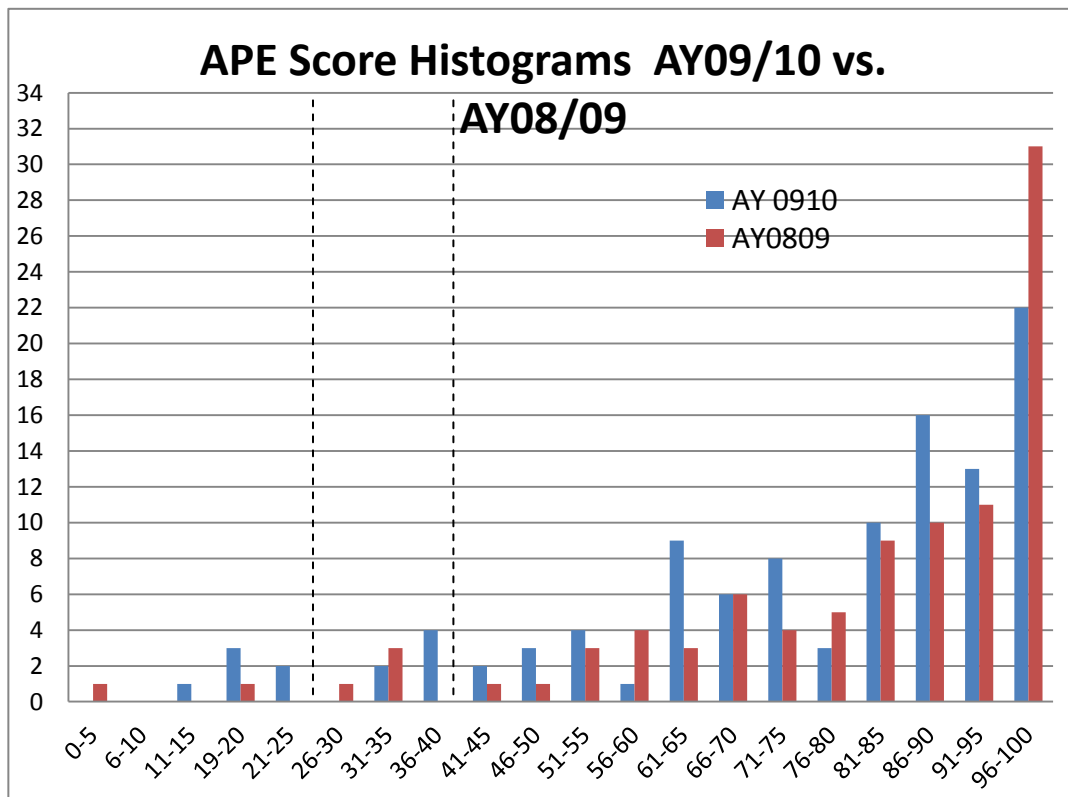


Fig. 2.2 – Histogram of APE Scores

In 08/09 there were two scores lower than 26 vs. six in 09/10. In 08/09 there were six scores lower than 41 vs. 12 in 09/10. It is apparent that the 09/10 results were skewed by a significant increase in very low scores. If we remove the scores below 26 the overall average for 09/10 rises to 78.4% (vs. 82.9% in

08/09). If we remove the 6 additional scores between 30 and 40 the overall average rises to 81.1% (vs. 84.6% in 09/10). These additional outliers may be related to recent enrollment pressures in the core programming sequence. They may also be due to an increase in communication amongst students that there is little downside to failing the first APE attempt, which could lead to an increase in the number of students making their first attempt with little preparation. This leads to the following recommendation:

- It is recommended that students scoring lower than 35% on an APE exam be required to see the department chair, who will discuss the student's scores with the student and make a determination as to whether some corrective action is warranted.

We considered one other factor as a possible contribution to the drop in exam performance. Any increase in the percentage of students making their first attempt would be pertinent. As mentioned above, some students will make their first attempt with little preparation since a failure on their first attempt does not have an adverse effect on their progress in the program. This is not, however, a factor in this case, as the number of first-time exam takers was 68%, compared to 79% in AY0809, 88% in AY0708, and 73% in AY0607.

Summer exam scores were substantially higher (83.4% average score and a 75.9% pass rate). It is thus possible that this was an anomaly or that the actions already taken have helped, but it is recommended that a close eye be kept on this data during AY10/11.

3. Ethics Essay Scores

Student ethics essays were collected from the Winter CSCD 490 Computing Ethics course and evaluated by a panel of four faculty reviewers according to the Ethics Essay rubric. Four of these essays were evaluated by two faculty members and the balance were each evaluated by a single faculty member.

Fig 3.1 shows summary data for all essays. The Organization and Coherence scores relate to Program Outcome (d) and the Stakeholders, Purpose, and Development scores relate to Program Outcomes (c) and (e).

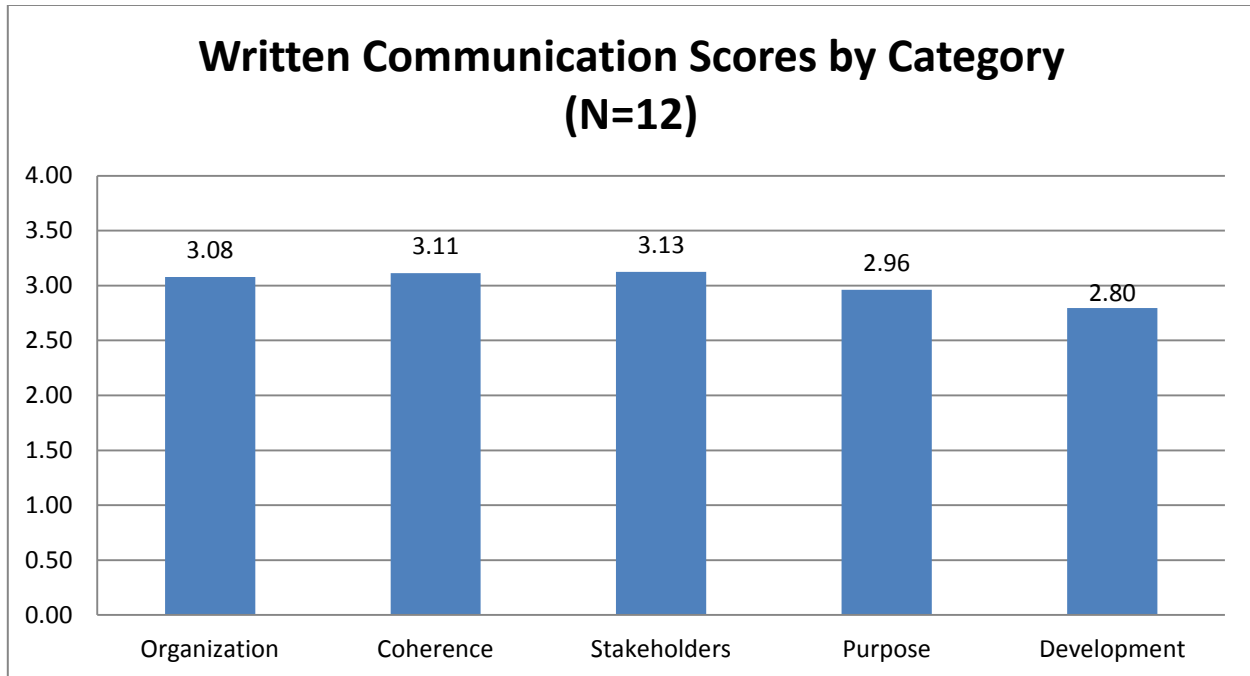


Fig. 3.1 – Summary Ethics Rubric Scores

The scores in each category are down slightly, but not significantly, from 2008/2009. All of the scores are acceptable, although the scores for Development could stand improvement. Three different adjunct instructors taught this class during 2009/2010 - it is recommended that ethics instructors be carefully advised to ensure students get practice in looking at ethical dilemmas from multiple points of view and in discussing alternative resolutions, which is what the Development category assesses.

4. Senior Project Rubric Scores

Oral Communication, Teamwork, and Technical Performance rubrics were applied to the work of 6 senior project teams during winter quarter, which was the only quarter of project coursework this year. These assessments are tied to Program Outcomes as follows:

Oral Communication Rubric Scores: (b), (d)

Teamwork Rubric Scores : (f)

Technical Rubric Scores: (g), (h), (i), (j), (k)

4.1 Oral Communication

Fig 4.1 shows the average scores for the presentations of 6 project teams. The Professional Development Awareness score relates to Program Outcome (d), and the other scores relate to Program Outcome (b).

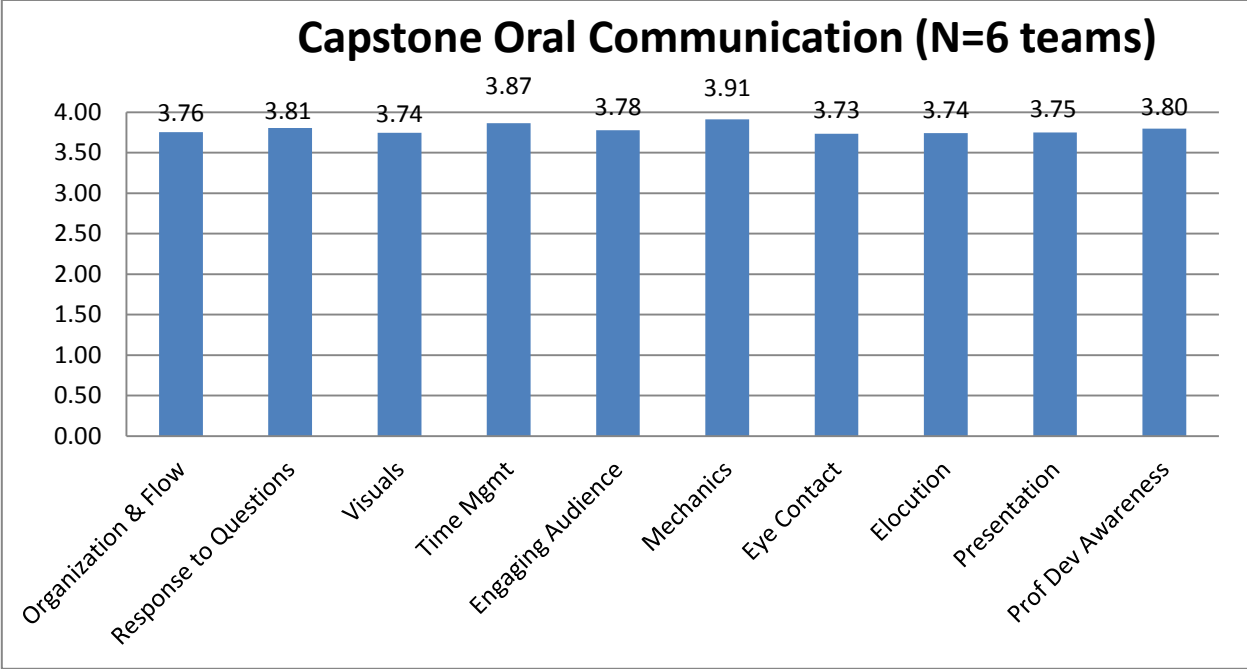


Fig. 4.1 – Project Oral Communication Rubric Scores

The scores indicate that student's are performing well against these learning objectives. No action based on Oral Communication data is recommended.

4.2 Teamwork

Fig 4.2 shows the average scores for the teamwork performance of 6 project teams. These scores relate to Program Outcome (f).

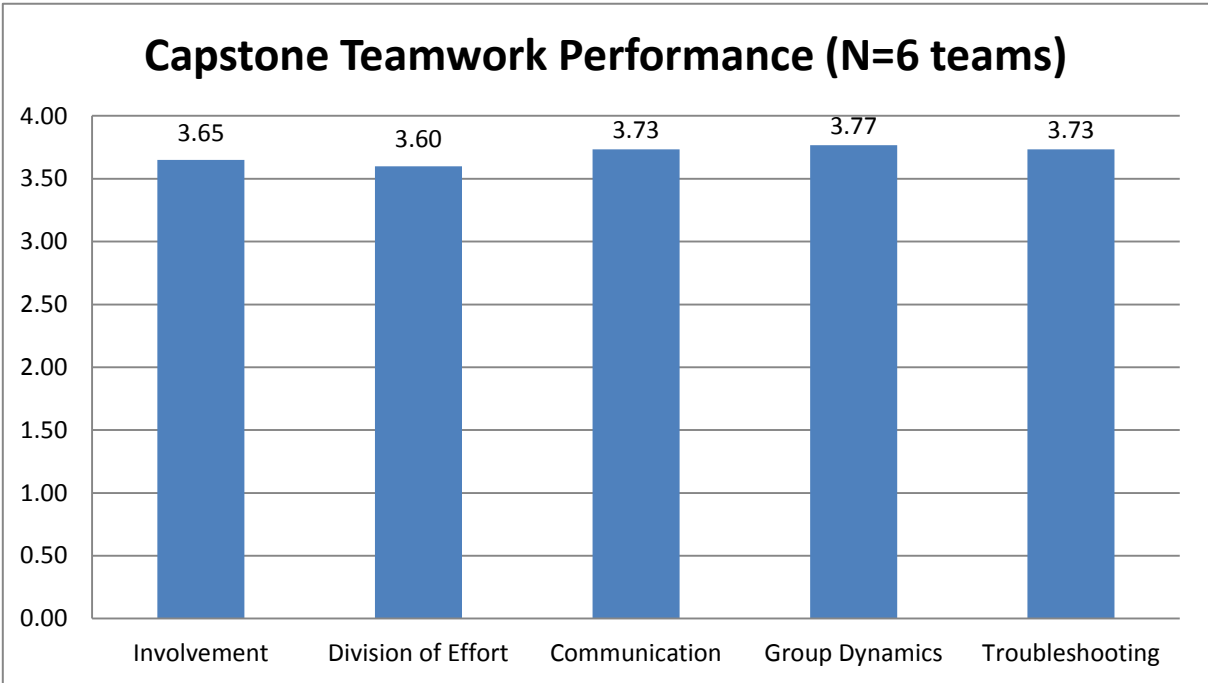


Fig. 4.2 – Project Teamwork Rubric Scores

The scores indicate that student's are performing well against these learning objectives. No action based on Team performance data is recommended.

4.3 Technical Performance

Fig 4.3 shows the average scores for the technical performance of 6 project teams. These scores relate to Program Outcomes (g), (h), (i), (j), (k).

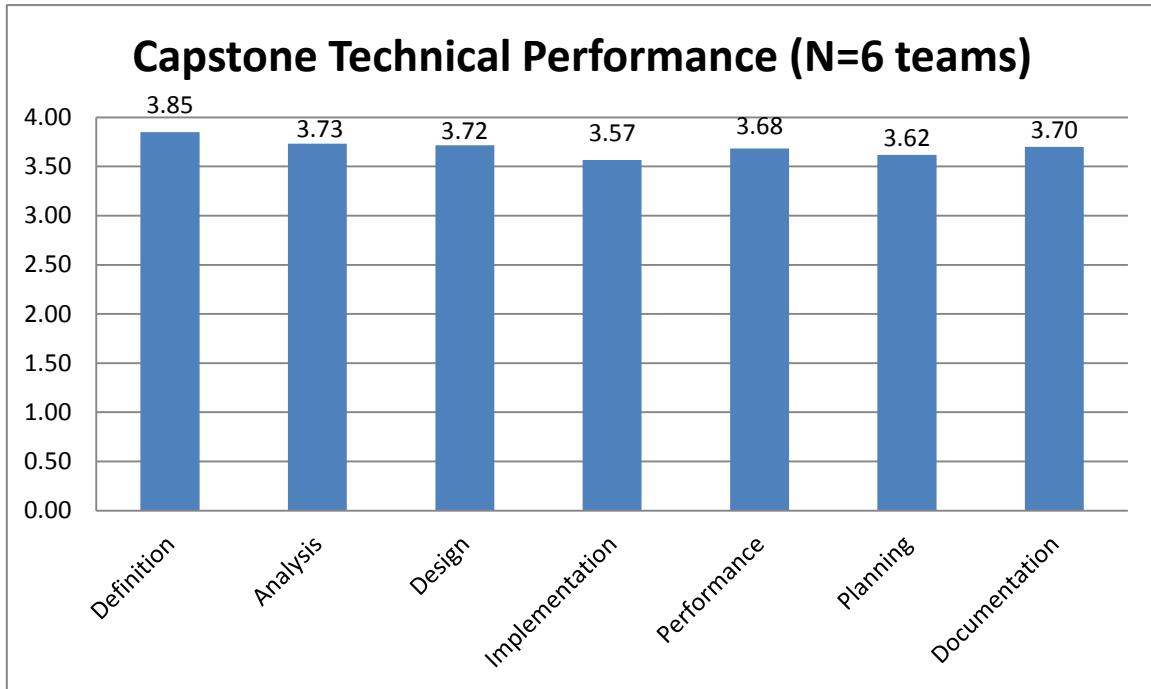


Fig. 4.3 – Project Technical Performance Rubric Scores

The scores indicate that student's are performing well against these learning objectives. No action based on Project Technical performance data is recommended.

5. Course-specific Outcome-related Learning Objectives

Course-specific assessments were conducted for the following courses. The reports are available in the /faculty_reposit/ABET/ directory for the course.

Course	Term	Outcomes	Result of Assessment
CSCD 240	Spring 10	(a), (h), (i)	Objectives met. Additional assignments were added based on last year's assessment recommendation in order to better match Outcome-related Learning Objectives.
CSCD 260	Winter 10	(g), (h), (i)	Objectives met. Task-switching assignment was modified based on last year's assessment recommendation.

CSCD 300	Fall 09	(a),(g),(h),(i),(j)	Objectives met. Initial assessment of ORLO iii (big-Oh analysis) revealed difficulties which resolved by the final assessment. This instructor confirmed that objectives regarding the level of coverage of binary trees were too ambitious for the course and also found flaws in the standard syllabus. ORLOs for this course were adjusted accordingly and the course description was modified to more accurately reflect the coverage of sorting, linked lists, and the topic sequence.
CSCD 320	Winter 10	(a),(g),(h),(i),(j)	Objectives met. Some dissatisfaction with the performance on graph algorithms and strategies.
CSCD 330	Fall 09	(a),(g),(i)	Objectives met.
CSCD 340	Fall 09	(a),(b),(h),(i)	Objectives met. Instructor suggests additional analysis of simulation results, for example on the memory assignment.
CSCD 350	Spring 10	(a),(g),(h),(k)	Instructor was a last-minute substitution for the scheduled instructor who fell ill. The substitute instructor was not adequately prepared to take on the course and as a result felt that the assigned projects were not sufficiently designed to evaluate performance against the course objectives. The assessment does, however, document that there were student activities for each objective.
CSCD 360	Fall 09	(g),(i),(j)	Objectives met. Instructor felt that the pipelining assignment is time-consuming but useful in providing hand-on experience with modern architectures.
CSCD 370	Winter 10	(a)	Objectives met.
CSCD 425	Spring 10	(a),(g)	Objectives not adequately met for the following reasons: Student participation was lower than in previous classes. Success on the PL/SQL project was dramatically lower than previous classes. Instructor plans to significantly reduce, and perhaps eliminate, the time devoted to database history and paradigms in order to devote additional time to fundamentals of SQL and data modeling. Instructor will also use this time to introduce advanced SQL features such as GROUP BY and CUBE. These topics will assist students transition into the data mining course (CSCD 429). Instructor also plans to require that ALL laboratory exercises be completed, as opposed to simply basing the grade on portions that they do complete.