

Annual Report for Assessment of Outcomes 2011-2012

Please address the questions below
send to learningassessment@pcc.edu by **June 22, 2011**; with Annual Report in the subject line

Note: Information provided in this report may be inserted into or summarized in Section 2C (LDC/DE)) or 6B (CTE) of the Program Review Outline.

1. Describe changes that have been implemented towards improving students' attainment of outcomes that resulted from outcome assessments carried out in 2010-2011. These may include but are not limited to changes to content, materials, instruction, pedagogy etc.

The Microelectronics Technology faculty is a group of professional instructors who continuously evaluate their work and their students' abilities and make instructional/curricular adjustments and improvements to best suit the students and the needs of the MT industry. This past year we were additionally tasked with our five-year program review, a large increase in enrollment and the associated advising issues, as well as some critical equipment malfunctions that required (and continue to require) significant last minute diagnostics and repairs as well as instructional adjustments. Time and resources were not available to fully address the results of last year's assessment. One area addressed is described next.

According to the program outcome assessment finished in June 2011, "troubleshooting" revealed poor student performance, both at the system and the component level.

As a result, the following changes were adopted in the first year -electronics classes, during 2011-2012 school year.

- 1) Labs in Digital II-troubleshooting section required and graded.*
- 2) Re-writing some lab experiments in MT 113.*
- 3) Re designing the practical examination in MT 113.*

For each outcome assessed this year:

The outcomes assessed in this report include:

- [Monitor and maintain semiconductor manufacturing processes.](#)
- [Communicate effectively with colleagues and vendors](#)

Monitor and maintain semiconductor manufacturing processes

2. Describe the assessment design (tool and processes) used. Include relevant information about:

- The nature of the assessment (e.g., written work, project, portfolio, exam, survey, performance etc.) and if it is direct (assesses evidence mastery of outcomes) or indirect (student's perception of mastery). Please give rationale for indirect assessments (direct assessments are preferable).
- The student sample assessed (including sample size relative to the targeted student population for the assessment activity) process and rationale for selection of the student sample. Why was this group of students and/or courses chosen?
- Any rubrics, checklists, surveys or other tools that were used to evaluate the student work. (Please include with your report). Where appropriate, identify benchmarks.
- How you analyzed results, including steps taken to ensure that results are reliable (consistent from one evaluator to another).

The MT assessments utilize assessments currently used in the MT program:

- *MT200: Student presentations based on structured research. Each student selects a semiconductor process to study. The evaluation rubric confirms knowledge of specific process controls and how they affect the process*

All students going through the MT program are assessed. This year that was 30-35 students.

Rubric:

1. Identify the processes
2. Associate the appropriate equipment with a process
3. Determine the desired output of a process and the associated monitoring equipment
4. Identify the process controls
5. Describe the effects of the process controls
6. Associate equipment failures with process defects

<u>Score</u>	<u>Description</u>
3	Demonstrates a high level of ability
2	Demonstrates an acceptable level of ability
1	Demonstrates an inferior level of ability
0	Does not demonstrate the ability
N/A	Ability was not included in the evaluation (students are not expected to cover every area.)

Analysis methods: basic data and correlation analysis. Reliability for the MT200 is based on the rubric design.

3. Provide information about the results (i.e., what did you learn about how well students are meeting the outcomes)?

- If scored (e.g., if a rubric or other scaled tool is used), please report the data, and relate to any appropriate benchmarks.
- Results should be broken down in a way that is meaningful and useful for making improvements to teaching/learning. Please show those specific results.

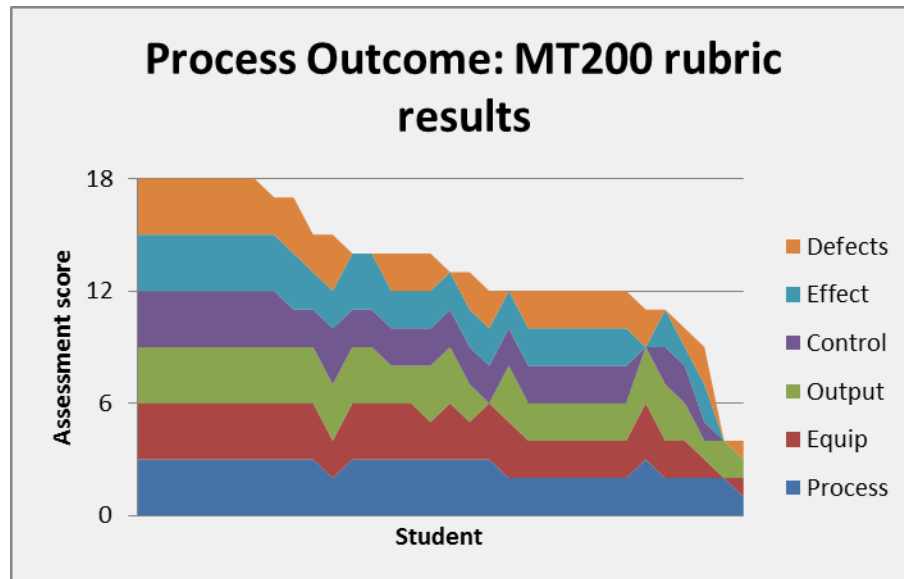


Figure 1: Assessment results for each of 32 students. 18 is the maximum score, proficiency is considered to be a score of 2 in each category, though students are not required to cover all categories.

Figure 1 shows the raw results for all students who took the assessment. This includes all students who took MT200 except for those that withdrew or failed. These students did not complete the assessment. All students who receive the base MT AAS degree must pass this course.

The result indicates that roughly 80% of MT students are demonstrating proficiency in this outcome (suggested by a minimum score of 12.) There is some complexity here as students are not required to cover all areas. They should score at least 2 in each area they cover. Some scores of 10 should be considered proficient, while some higher scores might include areas of inadequate performance masked by advanced performance in other areas. There are no scores of zero; points on the graph suggesting zero indicate the area was not covered. Scores of 1 are a concern. Too many scores of zero is also a concern as students should cover most of these areas.

Though not clear on this graph, no particular area stands out showing weakness. Students chose areas based on interest, and those choices were fairly evenly distributed with all showing examples of competence. This demonstrates that the program is covering these areas adequately.

One key aspect that the department should consider is the complexity in interpreting these results. This method for assessing this program outcome should be reconsidered to improve its reliability and reduce its demand on faculty.

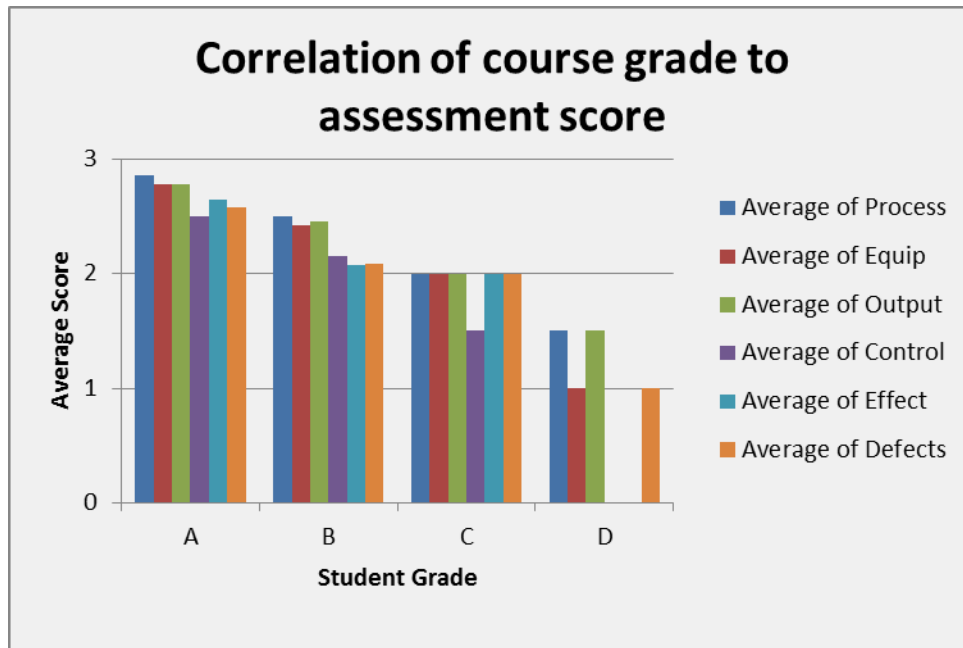


Figure 2: Assessment correlated to student grades.

Figure 2 shows that there is a strong correlation between student grades and the assessment results. This should be expected since the outcomes of the course are aligned with the outcomes of the program. Considering the issues with the rubric, it is recommended the department use student grades in MT200 to assess program performance.

4. Identify any changes that should, as a result of this assessment, be implemented to help improve students' attainment of outcomes. (These may include, but are not limited to, changes in curriculum, content, materials, instruction, pedagogy etc).

Students are attaining the program outcomes. Those individuals that are not attaining the outcomes are likely those students not willing or not able to apply themselves to their coursework. There are not sufficient resources in the program to address this.

5. Reflect on the effectiveness of this assessment tool and assessment process. Please describe any changes to assessment methodology that would lead to more meaningful results if this assessment were to be repeated (or adapted to another outcome). Is there a different kind of assessment tool or process that the SAC would like to use for this outcome in the future? If the assessment tool and processes does not need to be revised, please indicate this.

As discussed above, it is recommended this rubric be abandoned and MT200 course grades be used to assess this outcome.

Communicate effectively with colleagues and vendors

2. Describe the assessment design (tool and processes) used. Include relevant information about:

- The nature of the assessment (e.g., written work, project, portfolio, exam, survey, performance etc.) and if it is direct (assesses evidence mastery of outcomes) or indirect (student's perception of mastery). Please give rationale for indirect assessments (direct assessments are preferable).
- The student sample assessed (including sample size relative to the targeted student population for the assessment activity) process and rationale for selection of the student sample. Why was this group of students and/or courses chosen?
- Any rubrics, checklists, surveys or other tools that were used to evaluate the student work. (Please include with your report). Where appropriate, identify benchmarks.
- How you analyzed results, including steps taken to ensure that results are reliable (consistent from one evaluator to another).

The MT assessments utilize assessments currently used in the MT program:

- *MT240 and MT222: write a report on lab and research activities using a standard format. Instructor has developed appropriate assessment rubrics.*
- *MT200: Student presentation of a technical topic so that peers can understand and learn. Instructor has developed appropriate assessment rubrics.*
- *WR227: design and produce the most commonly used types of technical communications, include visuals, accurate, easy to access and understand... We will use the term grade of this course as a part of our assessment of student learning in this outcome.*

All students going through the MT program are assessed. This year that was 30-35 students.

Rubrics:

- *MT240 and MT222:*
 1. Organize information into the appropriate document parts
 2. Format the document for easy reading and evaluation
 3. Use proper spelling
 4. Use proper grammar
 5. Demonstrate effective proofreading
 6. Display data in appropriate and correct tables and charts

<u>Score</u>	<u>Description</u>
3	Demonstrates a high level of ability
2	Demonstrates an acceptable level of ability
1	Demonstrates an inferior level of ability
0	Does not demonstrate the ability
N/A	Ability was not included in the evaluation

- *MT200:*

1. Gather appropriate information
2. Organize the information into an effective communication
3. Create the communication
4. Present the communication to fellow students
5. Learn from fellow students' communications

<u>Score</u>	<u>Description</u>
3	Demonstrates a high level of ability
2	Demonstrates an acceptable level of ability
1	Demonstrates an inferior level of ability
0	Does not demonstrate the ability
N/A	Ability was not included in the evaluation

- *WR227: course grades. See WR227 CCOG for details.*

Analysis methods: basic data and correlation analysis. For MT240 all students were evaluated by the same instructor. Reliability for the MT200 is based on the rubric design. No effort was made to control reliability of the WR227 results.

3. Provide information about the results (i.e., what did you learn about how well students are meeting the outcomes)?
 - If scored (e.g., if a rubric or other scaled tool is used), please report the data, and relate to any appropriate benchmarks.
 - Results should be broken down in a way that is meaningful and useful for making improvements to teaching/learning. Please show those specific results.

One might consider the following results with a note of humor – what can one expect when engineers evaluate abilities in communication? The evaluations based on MT courses are indeed done by engineers, who do not necessarily have any relevant training in assessing communication, other than our experience communicating within the industry.

It should also be considered that by assessing communication we are assessing abilities that have been acquired over a lifetime of learning. Communication is taught at all levels of education, directly and indirectly. Within the MT course there is minimal focus on communication instruction – communication is mainly used as a means of instruction and assessment. This is important to consider as the ultimate question addressed by this report is how we can improve instruction within the program. It would be difficult to apply these results only to MT courses when the underpinnings of communication are so dependent on earlier learning.

Communication is an outcome of the MT program because it is considered to be a vital ability by our Advisory Board and our students' future employers. It is for this reason that we require communications courses such as WR227 Technical Writing, SP130 Business and Professional Speech Communication, and SP215 Small Group Communication: Process and Theory. We expect that our students get the relevant college level instruction in these communications areas here, by instructors qualified to teach and assess these concepts. Because of this it makes sense to base the assessment of our program outcome on these experts' evaluations.

MT240:

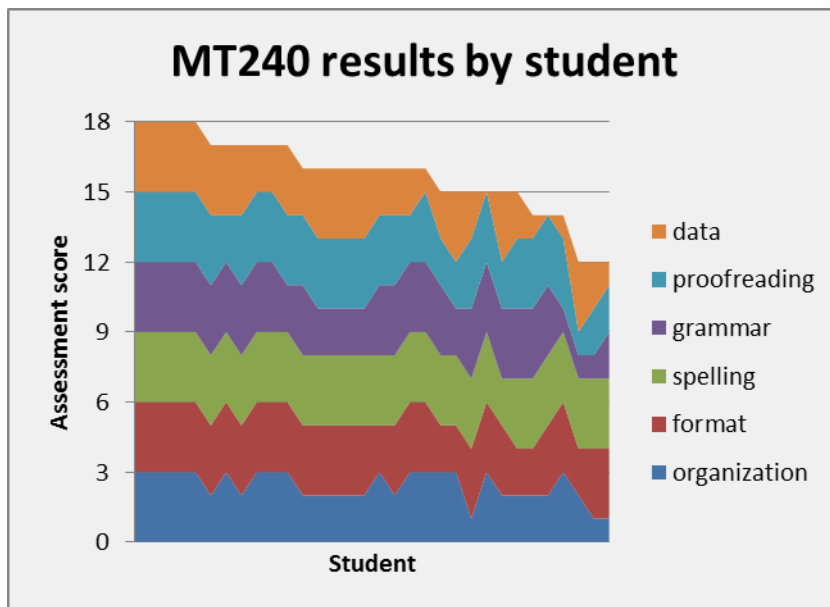


Figure 3: Assessment results for each of 33 students. 18 is the maximum score, proficiency is considered to be a score of 2 in each category for a total of 12 points.

Figure 3 shows the raw results for all students who took the assessment. This includes all students who took MT240 except for those that withdrew or failed. These students did not complete the assessment. All students who receive the base MT AAS degree must pass this course.

The result indicates that nearly all MT students are demonstrating proficiency in this outcome (suggested by a minimum score of 12.) Note that students should score at least 2 in each area; some higher total scores might include areas of inadequate performance masked by advanced performance in other areas. Scores of zero and 1 are a concern.

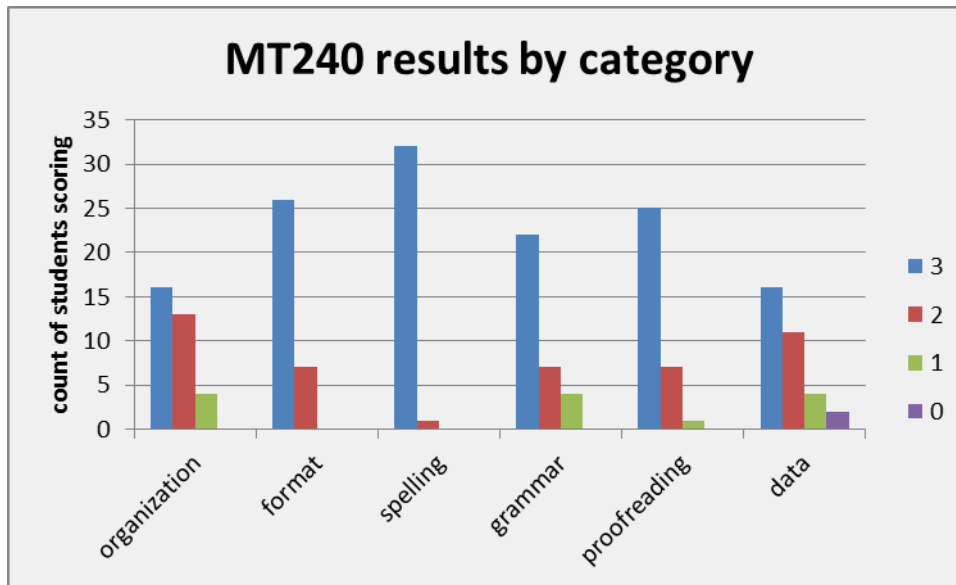


Figure 4: Number of students scoring at each level within each category. The highest any column can be is 33, the number of students in the class. The total height of the bars within each category should be 33.

Figure 4 shows the same data counting the number of students scoring at each level of the rubric, broken down by category. The high scoring in spelling can be attributed to the spell check available within the software programs used by students. However, the greater spread in the proofreading scores can also be attributed to the use of spell checkers as we all grow too dependent on software. Proofreading and grammar scores are influenced by the number of non-native English speakers in the program, an underpinning we do not have the resources to address within the department.

Format is an area we try to support as graduates are expected to use word processing software on the job. We expect students to effectively use such software, though provide no specific instruction in its use. We do expect students to learn (as we did) from experience and from colleagues.

Organization is another area we have direct control over as this reflects the students' use of the report format dictated by instructors. The MT department is fairly uniform in the expected format from each instructor, and report writing is integrated within the curriculum, building on course sequences from reporting simple concepts to broader and more complex laboratory experiments.

Data Presentation is also an area we can influence, though we expect our students to get a lot of instruction and evaluation in data reporting in their math and science classes, as well as the communications courses mentioned previously. There is currently no specific instruction within MT courses on presenting data.

MT222: data was not collected due to lack of time. The results are expected to be redundant with those from MT240.

MT200:

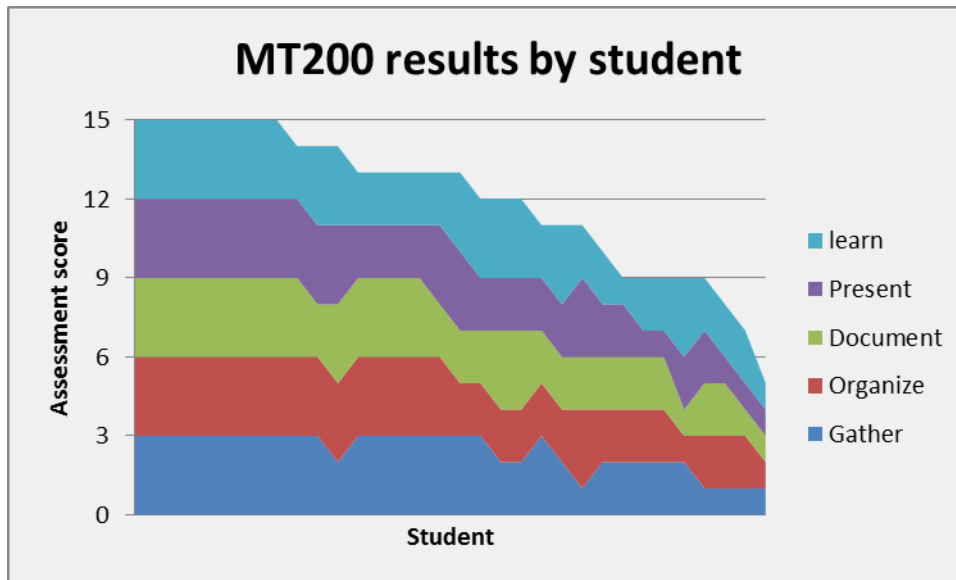


Figure 5: Assessment results for each of 32 students. 15 is the maximum score, proficiency is considered to be a score of 2 in each category for a total of 10 points.

Figure 5 shows the raw results for all students who took the assessment. This includes all students who took MT200 except for those that withdrew or failed. These students did not complete the assessment. All students who receive the base MT AAS degree must pass this course.

The result indicates that 70% of MT students are demonstrating proficiency in this outcome (suggested by a minimum score of 10.) Note that students should score at least 2 in each area; some higher scores might include examples of inadequate performance in certain areas masked by advanced performance in other areas. Scores of zero and 1 are a concern.

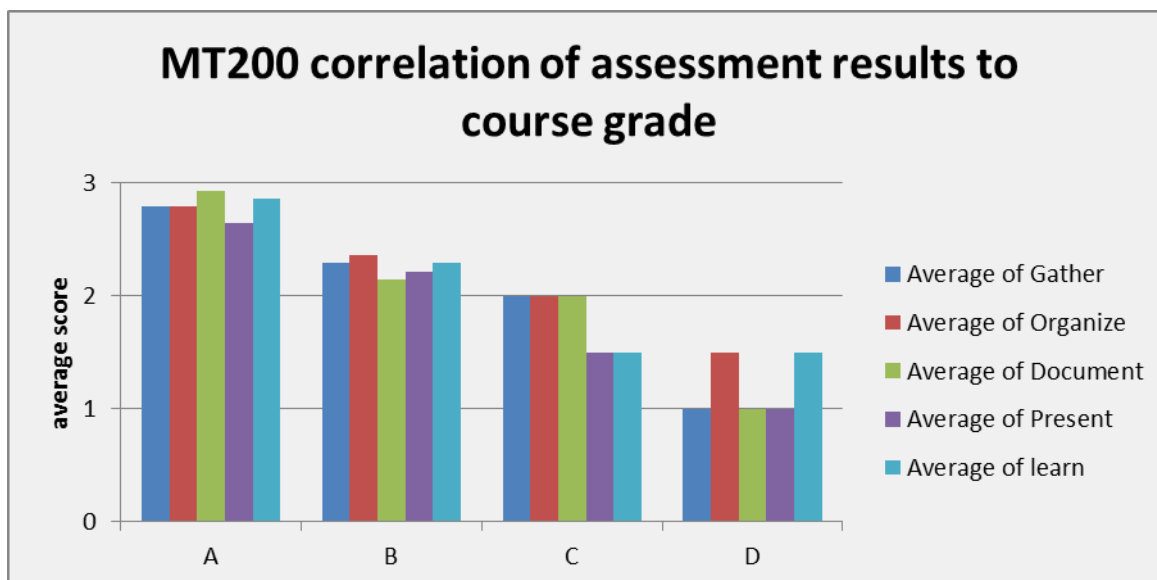


Figure 6: Assessment correlated to student grades. The maximum any bar can be is 3, 2 is considered proficient.

Figure 6 shows the same data broken out by student course grade and assessment area. The data shows a strong correlation between course grade and performance on the assessment. This is expected as the assessment tool is integrated into the instruction program of the course, representing the main focus for the course. This suggests that course grade is a good way to assess how well MT students are meeting this program outcome. Grades of A and B show proficiency in this aspect of communication. Grades of C and D indicate weakness in this area.

The data shows that no particular area stands out as an issue for students. There are stronger differences shown for students with C's and D's, but the data here represents very few students, thus these differences are indistinguishable from noise. There is some suggestion that students could use improvement in presentation aspects. MT faculty are not trained to teach these concepts; our goal is to give them more experience and hence opportunity to improve as they will continue to do on the job.

WR227:

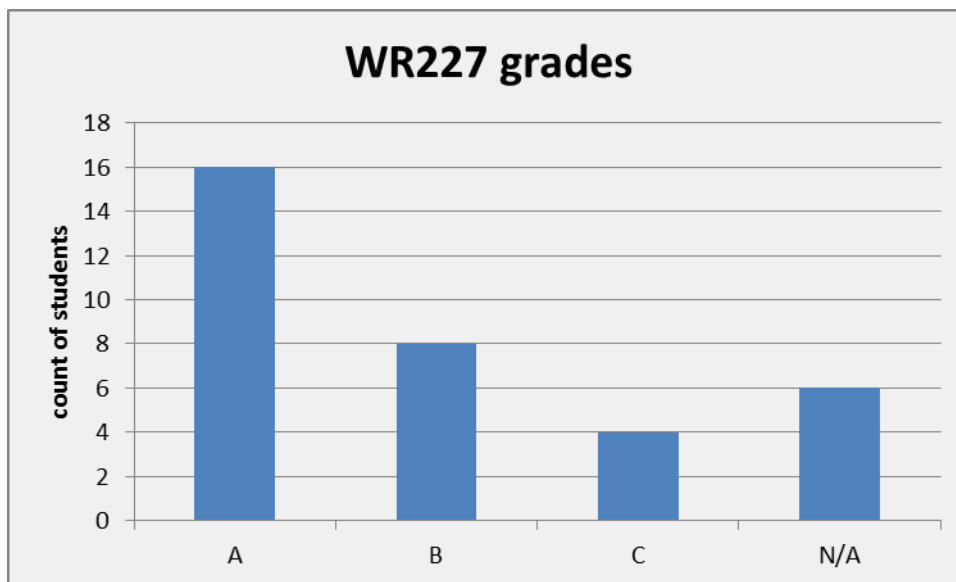


Figure 7: Assessment correlated to student grades.

Figure 7 shows the raw results for all current second year MT students who took WR227. All students who receive any MT AAS degree must pass this course. The N/A category mostly includes students who have substituting transfer credit, plus a few who have yet to take the course.

The result indicates that 84% of MT students received A's and B's in this course, demonstrating a high level of competency in much of the course content, for which the outcomes directly indicate abilities in technical written communication.

4. Identify any changes that should, as a result of this assessment, be implemented to help improve students' attainment of outcomes. (These may include, but are not limited to, changes in curriculum, content, materials, instruction, pedagogy etc).

Written: The MT program is meeting the communication outcome in the written format. There are two areas we address that we can consider for improvement: report organization standard and data presentation. The MT SAC should reevaluate how these concepts are integrated into our classes.

Oral: There is less strength here as compared to other measured outcomes in the MT program. It would be interesting to compare the MT student results to those from other populations; students have more opportunities and fewer reservations to write! The MT SAC might consider adding SP111 Public Speaking to the curriculum.

5. Reflect on the effectiveness of this assessment tool and assessment process. Please describe any changes to assessment methodology that would lead to more meaningful results if this assessment were to be repeated (or adapted to another outcome). Is there a different kind of assessment tool or process that the SAC would like to use for this outcome in the future? If the assessment tool and processes does not need to be revised, please indicate this.

The assessment methods used here are minimally invasive as they utilize assessments already integrated into the curriculum.

No change is recommended for the MT240 assessment

It is recommended that the MT222 assessment be eliminated due to duplication of efforts

The MT200 assessment should be reevaluated with an effort put towards deconvoluting the communications aspects from the process aspects. Improvements in reliability should also be considered.

We should consider adding course grades from SP130 and SP215 to this evaluation.