

Developing Program Outcomes to Measure Student Success: A General Approach for Faculty and Administrators



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1

1

Outcomes and Basis

- Outcomes
 - Upon the conclusion of this presentation, the participants will understand:
 - measures used by the NCDE.
 - development of goals, objectives, and student learning outcomes (SLOs).
 - collection and reporting data so that comparisons can be made to national benchmarks.
- Basis
 - This presentation is based on “Pathways to Success Tenth Year Report” (Fowler, P. R., 2015)
 - Includes goals, objectives, and student learning outcomes (SLOs) along with how each is assessed
 - Raw and NCDE adjusted data through spring 2016

2

2

Is a Statistics Degree Needed to Conduct Program Evaluation?

- **NO!** (see pages 14-15 for definitions)
- An understanding of **basic descriptive statistics** along with some **measurement theory** is needed
 - **SLOs** (remember the old behavioral objectives?)
 - Assessment Types
 - **Direct** – analysis of behaviors that demonstrate the extent of learning
 - **Indirect** – evidence of student learning based on opinion
 - **Internal** – assessment of learning created within an institution
 - **External** – assessment of learning created outside of an institution
 - Measures of **central tendency** (mean, median, and mode)
 - **Variance** (or spread) of scores in a distribution...I typically use the standard deviation
 - **Central Limit Theorem** – sampling
- Inferential Statistics is another matter...

3

3

The Importance of Assessment?

- To determine if students are learning
- To assess specific outcomes
- To create a cycle of continuous improvement
- Accreditation
- Accountability to stakeholders and taxpayers
- Press
 - *Remediation: Higher Education's Bridge to Nowhere* (CCA, 2012)
 - *Some states have cut back on remedial education, saying it's broken* (Chronicle 9/21/16)

4

4

NCDE Criteria for Program Evaluation – Quantitative

- Descriptive data
- How many:
 - Students **participated in the program/courses**?
 - **Hours of tutoring** were offered?
 - **Sections of DE courses** were offered?
- What **percent** of the students **who entered** the course **stayed for the entire term**?
- **Example:** In fall 2016, 93% of the students completed the semester...

5

5

NCDE Criteria for Program Evaluation – Quantitative

- How many of those who participated in the course/program **remained for one semester**?
- What percent of those who:
 - **stayed the entire term earned a C or better**?
 - **Example:** 39% in fall 2003 and 9% in fall 2016 were placed on probation
 - Those who withdraw are removed from total n
 - Those who violate the attendance policy are removed from the total n.
- What were the **gain scores** for those taking the course and receiving tutoring?

6

6

NCDE Criteria for Program Evaluation – Quantitative

- What percent of those who:
 - **passed the lowest level DE course taken and passed the next level DE course?**
 - **passed the highest level DE course taken and passed the next level curriculum course in that subject?**
 - took one or more developmental courses were **retained from fall to fall?**
 - **Example:** 34% F 03 to 04 and 49% F 15 to 16
 - took one or more developmental courses **graduated within 2, 3, 4, 5, and 6 years?**

7

7

NCDE Criteria for Program Evaluation - Qualitative

- To what extent are student users **satisfied** with the program?
- What are **faculty/staff perceptions** of the
 - program?
 - program's students?
- What is the **impact of program on the campus** as a whole?



8

8

Role of Data (including SLOs) in Program Evaluation

- Is the program effective?
 - SLOs – are the students learning anything?
 - Weaknesses – can they be addressed?
 - Incremental change
 - Do no harm to students
 - Student learning
 - Faculty reaction to change or when they disagree
- Decision making...
- Strategic direction...



9

9

NCDE's Criteria for Program Evaluation

- Is based on **indirect measures** and does not include **direct assessment of student learning**
- Probably would not be found compliant by an institutional effectiveness evaluator during an accreditation visit
- LSU Eunice directly **assesses SLOs in all DE courses:**
 - Study Strategies (3 cr) and College Reading (3 cr)
 - Pre-Algebra (3 cr) and Introduction to Algebra (3 cr)
 - English Composition (3 cr)
- All SLO information is included in the 10th year report and Institutional Effectiveness documentation referenced on page 15

10

10

Elements of Assessment

- **Unit Mission:** A broad, comprehensive statement of the unit's purpose.
- **Unit Vision:** A compelling conceptual image of the desired future.
- **Unit Goals** (see p. 6): A general statement of what is to be accomplished tied to the mission statement and strategic plan.
- **Objectives** (see p. 6): Specific, measurable outcome statements for the accomplishment of goals that include student learning outcomes (where appropriate).

11

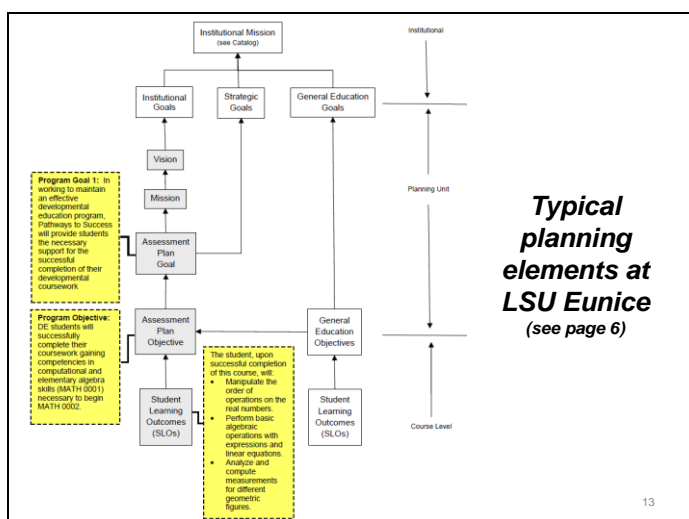
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Elements of Assessment

- **Objective with intended outcomes** (see p. 6): Include who is responsible.
- **Assessment/Evaluation Strategies:** The methods used to accomplish objectives, the benchmark and rationale, how often, and whether a sample is used.
- **Assessment Results** (Progress Report): Statement of progress toward accomplishment including accomplishment, sample, how assessment took place, and whether objective was met or not.
- **Improvement Plans:** Statement of changes made based on assessment/evaluation results even if objective was met.

12

12



13

Example – Goal DE

Program Goal 1 (see p. 7): In working to maintain an effective developmental education program, Pathways to Success will provide students the necessary support for the successful completion of their developmental coursework

- Relates upward to institution's strategic goals
 - 1 – access to higher education
 - 2 – success in higher education
 - 3 – establish partnerships
 - 4 – continuous improvement

14

14

Example Continued - Mathematics

- Relates downward to:
 - **Program Objective** (see p. 8): DE students will successfully complete their coursework gaining competencies in computational and elementary algebra skills (MATH 0001) necessary to begin MATH 0002.
 - **(Assessed through course level SLOs)** The student, upon successful completion of this course, will:
 1. Manipulate the order of operations on real numbers.
 2. Perform basic algebraic operations with expressions and linear equations.
 3. Analyze and compute measurements for different geometric figures.

15

15

Objective Example - English

- **Program Objective:** DE students will successfully complete their developmental course work gaining competencies in developmental English composition (ENGL 0001) mechanics, sentence structure, and paragraph structure necessary to successfully begin their first general education English composition course.
- **Course SLOs:** Upon successful completion of this ENGL 0001 course, the student will
 1. Write a clear topic sentence that includes the main idea of the paragraph.
 2. Develop the body of the paragraph with substantial support: evidence, details, and facts
 3. Use proper grammar and punctuation throughout their writing.

16

16

Objective Example – Library

- **Objective:** Training in library digital resources based ACRL information literacy standards for students and faculty
- **SLOs** to support this objective are from Association of College and Research Libraries (ACRL) Standards.
 1. The information literate student determines the nature and extent of the information needed.
 2. The information literate student accesses needed information effectively and efficiently.

17

17

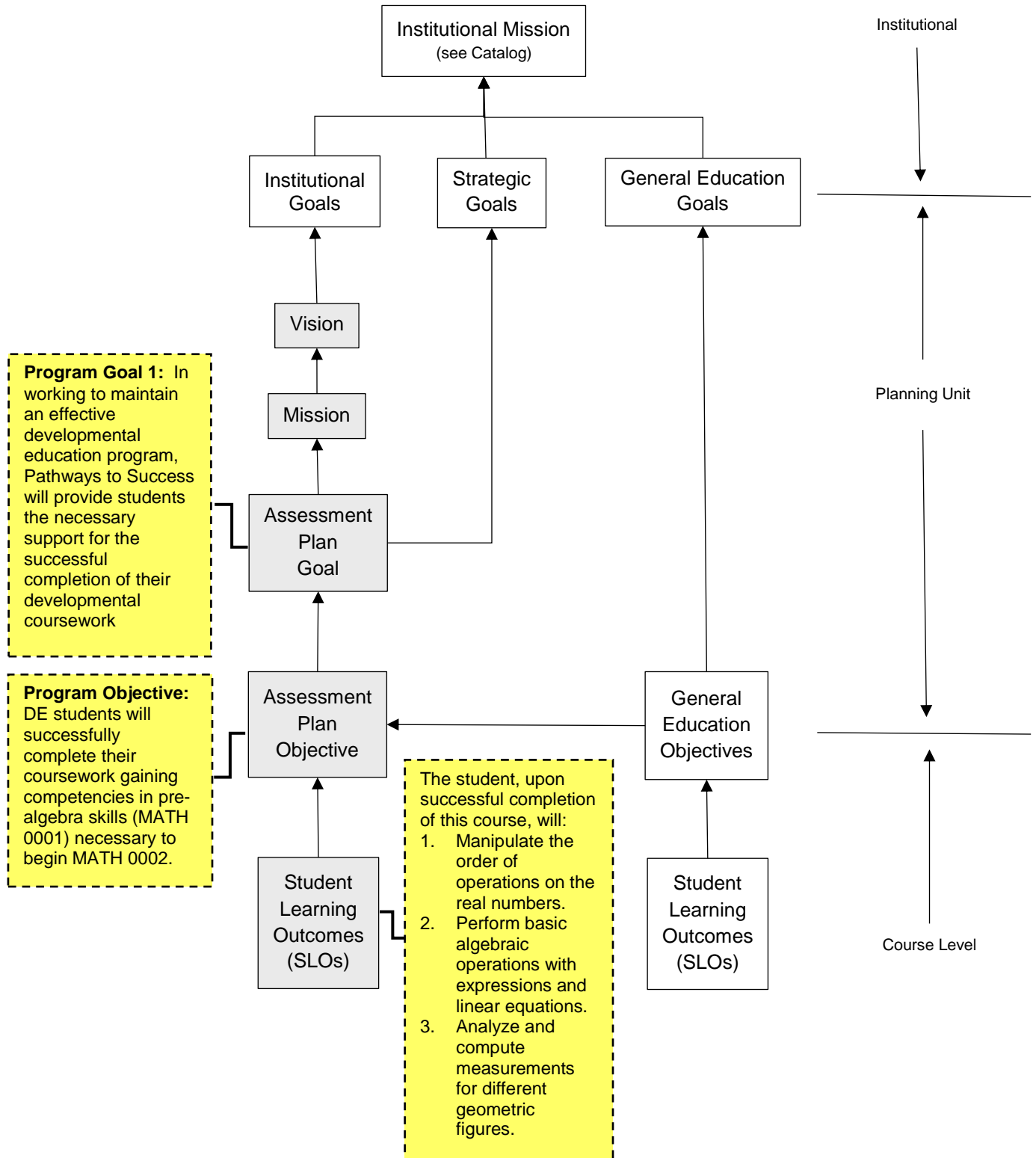
Now it is your turn...


- See page 7 for a goal write up with linkages up to institutional strategic goals and downward to the objectives
- See pages 8 – 11 for an objective write up
- See page 11 for a few other examples of goals and objectives
- See page 12 for blank goal worksheet
- See page 13 for blank objective worksheet
- See pages 15-16 for definitions and Websites

18

18

General Flowchart of LSU Eunice Planning Elements



 **15-16 Developmental Coursework:** In working to maintain an effective developmental education program, Pathways to Success will provide students the necessary support for the successful completion of their developmental coursework.

Goal Number: 1

Goal: Developmental Coursework: In working to maintain an effective developmental education program, Pathways to Success will provide students the necessary support for the successful completion of their developmental coursework.

Start: 11/1/2015

End: 10/31/2016





Progress: Completed

Provided By: Developmental Education

Participants: Developmental Education Director (Paul Fowler)

Budget Information: none (existing)

Items This Outcomes Assessment Goal Supports

Type	Number	Name	Start Date	End Date	Provider	Progress
Strategic Goal	1. Ensure Access	To serve the citizens of Louisiana and position the University strategically, LSU Eunice seeks to ensure student access.	11/01/2016	10/30/2017	LSU Eunice	
Strategic Goal	2. Student Success	To serve the citizens of Louisiana and position the University strategically, LSU Eunice seeks to strengthen student success.	11/01/2016	10/30/2017	LSU Eunice	
Strategic Goal	3. Partnerships	To serve the citizens of Louisiana and position the University strategically, LSU Eunice seeks to expand partnerships.	11/01/2016	10/30/2017	LSU Eunice	
Strategic Goal	4. Improvement	To serve the citizens of Louisiana and position the University strategically, LSU Eunice seeks to demonstrate a culture of continuous improvement.	11/01/2016	10/30/2017	LSU Eunice	

Items Supporting This Outcomes Assessment Goal

Type	Number	Name	Start Date	End Date	Provider	Progress
Outcomes Assessment Obj.	1.1	Developmental English (ENGL 0001)	11/01/2016	10/30/2017	Developmental Education	
Outcomes Assessment Obj.	1.2	Developmental Math (MATH 0001)	11/01/2016	10/30/2017	Developmental Education	
Outcomes Assessment Obj.	1.3	Developmental Math (MATH 0002)	11/01/2016	10/30/2017	Developmental Education	
Outcomes Assessment Obj.	1.4	Orientation to Univ Studies (UNIV 1005)	11/01/2016	10/30/2017	Developmental Education	
Outcomes Assessment Obj.	1.5	College Reading (UNIV 0008)	11/01/2016	10/30/2017	Developmental Education	



15-16 Developmental Math (MATH 0001)

Objective Number: 1.2 (NOTE: not all tables are provided due to space)

Objective: 15-16 Developmental Math (MATH 0001)

Start: 11/1/2015

End: 10/31/2016

Progress: Completed

Provided By: Developmental Education

Participants: Developmental Education Director (Paul Fowler)
Division Head - Sciences (John Hamlin)

Objective With Intended Outcomes: Developmental education students will successfully complete their developmental coursework gaining competencies in pre-algebra skills (MATH 0001) necessary to begin MATH 0002.

Assessment/

Evaluation

/Measures/

Strategies:

Direct Assessment:

The outcomes will be directly assessed and analyzed through a multiple choice comprehensive final examination designed by the mathematics faculty using the textbook publisher's Testgen program. All students taking the final exam in the fall 2015 and spring 2016 semesters will be assessed (i.e. no sampling). Assessment will include LSU Eunice and LSU Alexandria site students, modular students, dual credit students, and online students. The final exam for modular math students is both multiple choice and free response. Questions parallel the student learning outcomes for all other sections. The student learning outcomes in MATH 0001 are: The student, upon successful completion of this course, will:

1. Manipulate the order of operations on the real numbers.
2. Perform basic algebraic operations with expressions and linear equations.
3. Analyze and compute measurements for different geometric figures.

These outcomes are contained in the MATH 0001 [course syllabus](#) for both fall 2015 and spring 2016.

The benchmark established for the SLOs is 70% which is the traditional "C" grade according to the LSU Eunice Catalog. This was chosen as the minimum competency necessary in order to begin MATH 0002.

Indirect Assessment:

One indirect measurement is also included using data from institutional research using the completion rate for the MATH 0001 course over the 15-16 academic year. The rate is calculated using the methodology from the National Center for Developmental Education (NCDE) in that the frequency of withdrawals and failures due to the attendance policy (in MATH 0001 only) are removed from the total n. The national benchmark according to the NCDE is 68%.

Assessment/ Evaluation Results (Progress Report): For AY 2014-2015, Outcome 1.2 was met.
Direct Assessment

[Table 1](#) details the SLO data for the 428 students who took the final exam over AY 2015-2016. In all, there were 30 sections of the course at five different sites or methodologies. Data was reported for four of the five sites. The accelerated site was a special population of four students of prison guards at a local correctional institution. No data was collected from the site since there were only four students and it was the instructor's first time teaching the course.

Table 1. MATH 0001 SLO Results AY 2015-2016 Aligned to QEP.

MATH 0001 SLO Description	Overall	Modular	LSUE	Dual Credit	LSUA	Online	Accelerated
Overall	74	74	75		75	70	
1.1.1. Manipulate order of operations with real numbers	80	82	79		81	71	
1.1.2. Perform basic algebraic operations with expressions and linear equations	74	73	72	None	79	69	No Data
1.1.3. Geometry	67	62	72		69	71	
Total number of students tested	428	205	114		73	32	4
Total number of sections for AY	30	13	8		6	2	1

As [Table 1](#) demonstrates, students scored a 74% overall with all four sites reporting scoring within five percentage points of each other. Students scored an 80% on outcome one and 74% on outcome two. Students scored a 67% on outcome three; the geometry outcome continues to be an issue in the course. Modular students scored a 62% in AY 2015-2016 which is two percentage points higher than AY 2014-2015. In fact, the longitudinal data presented in [Table 2](#) indicates that student performance increased on all course outcomes with three increasing from 62% to 67%.

Table 2. Longitudinal SLO Results MATH 0001

MATH 0001 Student Learning Outcomes: All Sections	Sp 11	AY 11-12	AY 12-13	AY 13-14	AY 14-15	AY 15-16	Change
Overall	63	71	73	73	71	74	3
1.1.1. Manipulate order of operations with real numbers	68	77	78	78	75	80	5
1.1.2. Perform basic algebraic operations with expressions and linear equations	58	66	68	71	70	74	4
1.1.3. Geometry	x	64	67	64	62	67	5
Total number of students tested	259	714	608	512	483	424	

[Table 3](#) presents the item analysis for all face-to face sections with the most troublesome problem being number 50 in outcome 1.1.3 which was calculating the perimeter of a simple rectangle (see the [final exam for AY 2015-2016](#)). Evidently, students are forgetting the formula. [Table 4](#) presents the item analysis for modular sections. Problems 46 and 47, both associated with outcome three, only had a probability of success in the mid 20%. They are both similar problems dealing with finding an unknown in a geometric figure. Given that the observed student performance is 74% (see [Table 1](#)) > the benchmark of 70%, this part of objective 1.2 is met.

Indirect Assessment

Finally, student success rates are compared to the NCDE's established success rates for developmental mathematics nationally. [Table 5](#) details the rates for 599 students that were enrolled on the census day for fall 2015 or spring 2016. [Note that a total of 428 (71%) out of the 599 students took the final exam.] Overall, the raw success rate for MATH 0001 was 63% for AY 2015-2016 with modular students outperforming all other sites other than the four accelerated students. LSUA students performed at a corrected rate of 84% while LSUE students performed at a corrected rate of 62%. In addition, modular students withdrew from MATH 0001 at a rate of 10% while face to face students at the LSUA and LSUE sites withdrew at a rate of nearly 15%. While modular students have difficulty with outcome three, more of them complete MATH 0001.

Table 5. AY 15-16 MATH 0001¹ Course Success Rates.

Description	LSUA	Dual Credit	LSUE ²	Modular	Online	Accelerated	Totals
Total n	90		163	298	44	4	599
No. of Ws	13	none	24	29	6	0	72
No. violation of attendance policy	4		7	2	0	0	13
Grade of A, B, C only	61		82	203	27	4	377
Percent raw success	68		50	68	61	100	62.9
Percent success using NCDE	84		62	76	71	100	73.3

1. Includes all students at all sites both Pathways and Non-Pathways.

2. Modular and online students not included in this number.

To compare the success rates in MATH 0001 to the NCDE national rate, the withdrawals and failures due to attendance issues are removed from the total n. Doing so yields a 73% success rate overall (see [Table 5](#)).



Since the observed success rate of 73% > the NCDE's national rate of 68%, this section of objective 1.2 is met. Given that the direct assessment and indirect assessment are both met, Objective 1.2 is met for AY 2015-2016.

Improvement Plan/ Changes Made: No changes are planned for objective 1.2 given the fact it was met overall.


The two issues with the item analysis
 #50 on the face to face exam dealing with perimeter
 #46 and #47 on the modular exam dealing with finding an unknown of a geometric figure
 will be discussed with the mathematics faculty to determine if anything can be done to assist students in mastering these problems.

Sent to the math faculty on 7/12/16 for their input.
 Request for information from the MATH 0001 final exam committee in the [math faculty meeting of 9-16-16 \(highlighted\)](#).

The math faculty [met on October 3, 2016](#) and discussed actions that could be taken to help students perform better on problems where the success rate was less than 50%.

-  [MATH 0001 Final Exam Committee Meetings](#)
-  [Math Dept mtg 9-16-16 Minutes MATH 0001](#)

Items This Outcomes Assessment Objective Supports

Type	Number	Name	Start Date	End Date	Provider	Progress
Outcomes Assessment Goal	<u>1</u>	15-16 Developmental Coursework: In working to maintain an effective developmental education program, Pathways to Success will provide students the necessary support for the successful completion of their developmental coursework.	11/01/2015	10/31/2016	Developmental Education	

Some Examples:

Goal 1: The QEP seeks to increase student learning in developmental mathematics using innovative techniques of instruction.

Objective 1.1: Increase achievement of SLOs in MATH 0001 and MATH 0002 (points to SLOs in the courses).

Objective 1.2: Increase the Cognitive Ability of Students in MATH 0001 and MATH 0002. Benchmarked on pre and post test data.

Speech Communication: Students will successfully complete their general education coursework developing competencies in oral communication required for their chosen major. This objective will be assessed using the following Student Learning Outcomes (SLOs) from CMST 1061. The student, upon successful completion of this course, should be able to

- Research for speeches and write a sentence outline with a bibliography
- Deliver speeches orally
- Effectively participate in group problem-solving activities

Students will successfully complete their general education coursework developing competencies in art as required by their curriculum. Uses SLOs in course.

**Blank Sheet for Goal**

Goal Number:	Number
Goal:	Fill in goal here
Start:	Date
End:	Date
Progress:	Ongoing
Provided By:	Department Name
Participants:	Person
Budget Information:	If none, the state that funding exists



Blank Sheet for Objective

Objective Number:	Number
Objective:	Shortened Name
Start:	Start date
End:	End date
Progress:	Be sure to mark completed when finished
Provided By:	Department
Participants:	Person
Objective With Intended Outcomes:	Needs to be measurable itself or through SLOs; include: "Upon the completion of this course, students will" at some point
Assessment/ Evaluation/ Measures/Strategies:	Procedure for assessing, how often, the target or benchmark considered for success and how it was arrived at, will a sample or the population be used
Assessment/ Evaluation Results (Progress Report):	Whether or not the objective was met last year (and what was done if it wasn't), total number of students and how many sections, data analysis for total and each site, tell why if sampling was used, last statement should state whether or not the objective was met.
Improvement Plan/ Changes Made:	Include an improvement plan even if objective was met.

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Descriptive Statistics – “a collection of methods for classifying and summarizing numerical data” (Hinkle, Wiersma, & Jurs, 1998; Minium, King, & Bear, 1993, p. 18).

Student Learning Outcome (SLO) – a statement of the desired competency

1. What is it that students are to master?
2. Described to me as the old behavioral objective

Direct Assessment – “an analysis of products or behaviors that demonstrate the extent of students’ mastery of learning outcomes” (Allen, 2006, p. 146). Examples:

1. Locally developed tests (such as embedded questions on a final exam)
2. Portfolios
3. Rubrics
4. Scores on standardized tests
5. Incoming – COMPASS, ACCUPLACER
6. Collegiate Assessment of Academic Proficiency (CAAP)

Indirect Assessment – evidence of student learning based on opinions (Allen, 2006)

1. Satisfaction surveys
2. Interviews
3. Self-assessment
4. Employer surveys
5. Student grades

Internal Assessment – an assessment created within an institution (by faculty members) where a comparison of the data to students from other institutions may not be possible). Examples:

1. Locally developed tests (can be final exams)
2. Locally developed rubrics

External Assessment – assessment created outside of the institution (data comparison from other institutions is possible). Examples:

1. Scores on standardized tests
2. National satisfaction surveys

Great examples of direct and indirect assessment can be found at Cleveland State University’s Office of Student Assessment at <https://www.csuohio.edu/offices/assessment/exmeasures.html>.

Measures of central tendency (if one exists). These are points within the data that describe the central location of the distribution of observations (Hinkle, Wiersma, & Jurs, 1998; Minium, King, & Bear, 1993).

1. Mean – arithmetic average
2. Median – often described as the middle score
3. Mode – most frequent score

Variance (or spread) of scores in a distribution

1. Standard deviation – A statistic that shows the spread or dispersion of scores in a distribution of scores...how widely the scores are spread out (Vogt, 1993, pp. 217-218).

The “average of the sum of squared deviations around the mean” Hinkle, Wiersma, & Jurs, 1998, p. 74).

Central Limit Theorem – “the random sampling distribution of the mean tends toward a normal distribution irrespective of the shape of the population of observations sampled; the approximation to the normal distribution improves as sample size increases” (Minium, King, & Bear, 1993 p. 242).

Inferential Statistics – “is a collection of methods for making inferences about the characteristics of the population from knowledge of the corresponding characteristics of the sample” (Hinkle, Wiersma, & Jurs, 1998; Minium, King, & Bear, 1993, p. 18).

NCDE’s site is at: <http://ncde.appstate.edu/>

NCDE’s Criteria for Program Evaluation is at:
<http://ncde.appstate.edu/sites/ncde.appstate.edu/files/evaluation.pdf>

LSU Eunice’s Pathways to Success site is at: <http://pathways.lsue.edu>.

LSU Eunice’s DE mission, goals, and objectives are at:
<http://web.lsue.edu/docs/DevelopmentalEd/mission.pdf>. The Vision is: The vision of the Office of Developmental Education is to provide a support network that creates a holistic foundation leading to success in college level coursework.

LSU Eunice’s Tenth Year Report is at: <http://web.lsue.edu/docs/DevelopmentalEd/Final10thyr.pdf>.

LSU Eunice’s raw DE data is at
<http://web.lsue.edu/docs/DevelopmentalEd/Pathwaysyeartoyearcomparisons.pdf>.

LSU Eunice’s Quality Enhancement Plan is at: <http://www.lsue.edu/qep2014/LSUEQEP2014.pdf>.

LSU Eunice’s Institutional Effectiveness reports are at: <http://www.lsue.edu/institutional-effectiveness/reports.php>.

Attewell, P., Lavin, D., Domina, T., and Levey, T. (2006), New evidence on college remediation. The Journal of Higher Education, 77 (5) 886-924.

Allen, M. J. (2006). Assessing General Education Programs. San Francisco, CA: Jossey-Bass.

Hinkle, D.E., Wiersma, W., and Jurs, S.G. (1998). Applied Statistics for the Behavioral Sciences. NY: Houghton Mifflin Co.

Minium, E.W., King, B. M., & Bear, G. (1993). Statistical Reasoning in Psychology and Education 3rd Ed. NY: John Wiley and Sons, Inc.

Vogt, W. P. (1993). Dictionary of Statistics and Methodology: A Nontechnical Guide for the Social Sciences. Newbury Park, CA: Sage Publications.