

Teaching for PROWESS Vision & Transformation Catalyst Tool - SNAPSHOT Rubric



Please read the entire Introduction before completing the Rubric

The Teaching for PROWESS (TfP) Vision & Transformation Catalyst Tool* is a diagnostic tool designed to be used in a self-study to evaluate the implementation of the recommendations of the AMATYC Standards (referring to [Crossroads in Mathematics](#), [Beyond Crossroads](#), and [IMPACT](#)) in mathematics departments. The work is based on the extensive work of Partnership for Undergraduate Life Science Education (PULSE)** which was focused on Biology in 4-year institutions. The rubrics have been modified based on the features expected in a 2-year college math department that has fully implemented all of the AMATYC recommendations. They are meant as tools to highlight the areas where departments stand out and areas where departments have made less progress.

The complete Teaching for PROWESS Vision & Transformation Catalyst Tool contains 8 rubrics:

1) Student Learning and the Learning Environment, 2) Instruction, 3) Curriculum and Program Development, 4) Assessment of Student Learning, 5) Diversity, Equity, and Inclusion, 6) Professionalism, 7) Climate for Transformation, and 8) Snapshot.

Terminology: The rubrics can be used to evaluate individual departments, or a division composed of mathematics faculty (either full-time or part-time) which will be referred to as ‘departments’ in this document. The use of the term ‘faculty’ throughout the rubrics is meant as a generic term for the range of possible titles for all those who are instructors in any course that is part of the department being evaluated.

Procedure: The faculty should individually determine scores for the rubrics. Each criterion begins with a **CONTEXT** section that should be read *prior to* reading the criterion’s descriptors. Once a score for a criterion is determined it is important to document the **justification** in the appropriate section of the table. After the individual results are completed, the department should determine a consensus score for each criterion. For more information and suggestions on completing this process, refer to the Rubric FAQs on the teachingforprowess.com website.

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Rubric VIII - Snapshot (14 criteria)

This rubric is designed as a tool for faculty and administrators to gain a quick overview of the alignment of their mathematics program with some of the major elements of the AMATYC standards. This short Snapshot Rubric comes directly from the complete set of rubrics and is intended to be used for several purposes: a) as an entry point or gateway to the set of seven individual rubrics; b) as a brief overview for conference and workshop participants; and c) as a standardized instrument to collect data across AMATYC Regions.

I. STUDENT LEARNING AND THE LEARNING ENVIRONMENT

CRITERION A2 (Learning Environment): Classrooms support active learning

CONTEXT: This criterion is related to the quality and effectiveness of the actual classrooms. The classroom should be large enough that every small group can work on vertical non-permanent surfaces (VNPS) such as whiteboards. Also, the classrooms should be flexible and reconfigurable with furniture that can be easily (and quickly) rearranged to accommodate student groups of different sizes. When scoring this criterion, estimate the percentage of classrooms that support active learning, by using the number of classrooms generally assigned to the department as the denominator and using the subset of classrooms that support active learning as the numerator.

A		(0) Baseline	(1) Beginning	(2) Developing	(3) Accomplished	(4) Exemplar
2	Classrooms support active learning	All assigned classrooms are lecture style with fixed seating	Less than 10% of assigned classrooms are flexible and reconfigurable to encourage student interaction on VNPS	10-50% of assigned classrooms are flexible and reconfigurable to encourage student interaction on VNPS	51-75% of classrooms are flexible and reconfigurable to encourage student interaction on VNPS; different types of classrooms are available for diverse teaching styles	More than 75% of classrooms are flexible and reconfigurable to encourage student interaction on VNPS; different types of classrooms are available for diverse teaching styles

Justification A2 (Required):

I. STUDENT LEARNING AND THE LEARNING ENVIRONMENT

CRITERION B2 (Resources and Support): Support staff for student learning

CONTEXT: This criterion is focused on the importance of adequate teaching and teacher support. How well does your institution support the teaching mission with support staff? Examples may include 1) administrative/office staff support, 2) a curriculum development or learning specialist who works with faculty members, 3) a faculty member in your department who engages in discipline based educational research (DBER) and 4) support for training of peer tutors when requested by instructors.

B		(0) Baseline	(1) Beginning	(2) Developing	(3) Accomplished	(4) Exemplar
2	Support staff for student learning	No support staff for student learning	Limited staff support for student learning	Adequate support staff for student learning	Sufficient support staff for student learning with a variety of expertise	Substantial support staff for student learning with a large variety of expertise

Justification B2 (Required):

II. INSTRUCTION

CRITERION A1 (Pedagogy): *Active learning*

CONTEXT: Mathematics faculty will facilitate active learning that promotes students' increased and deeper mathematical reasoning abilities in students. Widespread implementation of high-quality active learning can help reduce or eliminate achievement gaps in STEM courses and promote equity in higher education.

A		(0) Baseline	(1) Beginning	(2) Developing	(3) Accomplished	(4) Exemplar
1	Active and collaborative learning	No faculty foster active learning in the classroom	Few faculty foster active learning in the classroom	Some faculty foster active learning in the classroom	Many faculty foster active learning in the classroom	Most faculty foster active learning in the classroom and are well aware of the Active Learning principles

Justification A1 (Required):

II. INSTRUCTION

CRITERION B2 (Student Higher Level Learning): Student metacognitive development

CONTEXT: This criterion addresses the degree to which instructors encourage students to take ownership of, and to reflect on, their own learning. Metacognition (thinking about your own thinking) is defined as the process of setting challenging goals, identifying strategies to meet them, and monitoring progress toward them. For scores of 3 or 4, instructors integrate the practice of effective learning strategies supported by cognitive research and incorporate reflection on learning into course assignments and assessments.

B		(0) Baseline	(1) Beginning	(2) Developing	(3) Accomplished	(4) Exemplar
2	Student metacognitive development	Faculty do not guide students to reflect on and understand how to use learning strategies that are supported by cognitive research	Few faculty guide students to reflect on and understand how to use learning strategies that are supported by cognitive research	Some faculty guide students to reflect on and understand how to use learning strategies that are supported by cognitive research	Many faculty guide students to reflect on and understand how to use learning strategies that are supported by cognitive research	Most faculty routinely and intentionally guide students to reflect on and understand how to use learning strategies that are supported by cognitive research

Justification B2 (Required):

III. CURRICULUM AND PROGRAM DEVELOPMENT

At the conclusion of the first two years of their college studies, all students should have progressed in their development of certain intellectual abilities, habits of mind, and of other competencies and knowledge. Introductory college courses across disciplines should be designed to broaden an existing educational foundation and allow students to appreciate mathematics, statistics, and data science as powerful reasoning, modeling, and general problem solving tools.

CRITERION B1 (Standards for Intellectual Development): Inclusion of problem solving throughout the curriculum

Students will engage in relevant, authentic problem solving and mathematical and statistical thinking.

Students will use problem-solving strategies that require persistence, analysis of assumptions, intellectual risk taking, and application of appropriate procedures. These strategies should include posing questions; collecting and organizing information; constructing visual representations; solving similar, simpler problems; analyzing situations through trial and error, graphing, and modeling; and drawing conclusions by translating, illustrating, and verifying results. The students should be able to communicate and interpret their results.

Emphasizing problem solving will make mathematics more meaningful to students. The problems used should be relevant to the needs and interests of the students in the class. Such problems provide a context as well as a purpose for learning new skills, concepts, and theories.

B		(0) Baseline	(1) Beginning	(2) Developing	(3) Accomplished	(4) Exemplar
1	Inclusion of problem solving throughout the curriculum	Problem solving practices are not included in any courses	Minimal integration of problem solving practices in the curriculum	Problem solving practices are an explicit focus of at least one required course	Problem solving practices are an explicit focus across <i>several</i> required courses	Problem solving practices are an explicit focus in <i>most</i> required courses and students' use of these practices is assessed

Justification B1 (Required):

III. CURRICULUM AND PROGRAM DEVELOPMENT

CRITERION B7 (Standards for Intellectual Development): Developing mathematical prowess is expected throughout the curriculum

Students will engage in rich experiences in the study of mathematics, statistics, data science, and related fields that encourage independent, nontrivial exploration and will develop and reinforce tenacity and confidence in their abilities and inspire them to further their studies in these fields.

Students will develop self-confidence and persistence while engaging with mathematics, statistics, and data science problem-solving. These problems will not always have unique solutions but will provide experiences that develop the ability to conduct independent explorations. At the same time, they will learn to transfer problem-solving strategies to a variety of contexts (Druckman & Bjork, 1994) and appreciate mathematics, statistics, and data science as disciplines. They will visualize themselves using mathematics and statistics effectively in their professional work and everyday lives. They will develop an awareness of careers in mathematics and related disciplines.

B		(0) Baseline	(1) Beginning	(2) Developing	(3) Accomplished	(4) Exemplar
7	Developing mathematical prowess is expected throughout the curriculum	Independent, nontrivial exploration is not included in any courses	Minimal integration of Independent, nontrivial exploration in the curriculum	Independent, nontrivial exploration is an explicit focus of at least one required course supporting students' developing confidence and tenacity with mathematical practices	Independent, nontrivial exploration is an explicit focus across <i>several</i> required courses	Numeracy practices are an explicit focus in <i>most</i> required courses and students' use of these practices is assessed

Justification B7 (Required):

IV. ASSESSMENT OF STUDENT LEARNING

CRITERION A4 (Course Level Assessment): Inclusion of frequent formative assessments with teacher feedback to students

CONTEXT: Formative assessments are low stakes assessments, typically ungraded, used for determining learning rather than determining grades, for example, pre-class preparatory quizzes, in-class student problem solving, student response system questions, self assessments, etc. Typically, formative approaches are used by the instructor to adapt their teaching strategy based on student progress. Formative assessment should also be used to inform students of what they have mastered and what they still need to learn. Use of formative assessment should assist students in the ownership of their learning.

The following resources provide research on implementing this criterion: [Formative Assessment in Mathematics, Building Thinking Classrooms \(Chapter 13\)](#).

A		(0) Baseline	(1) Beginning	(2) Developing	(3) Accomplished	(4) Exemplar
4	Inclusion of frequent formative assessments with teacher feedback to students	Formative assessments are not given	Formative assessments are given, but students do not receive feedback	Some courses have formative assessments that measure learning outcome achievement and students receive feedback from instructors on what they learned	Many courses have formative assessments that measure learning outcome achievement and students receive feedback from instructors on what they learned	The majority of courses have formative assessments that measure learning outcome achievement and students receive feedback from instructors on what they learned

Justification A4 (Required):

IV. ASSESSMENT OF STUDENT LEARNING

CRITERION B6 (Program Level Assessment): Use of retention data to improve student persistence

CONTEXT: This criterion is related to the degree to which the data in B1, B2, B3, and B5 above are used to improve student persistence. For scores of 3 or 4, written departmental or institutional plans to increase the persistence of students in mathematics or other STEM disciplines would be important. Because persistence is adversely affected by the time it takes students to complete the mathematics courses in a STEM program, the department should consider if measures were undertaken to accelerate students through the mathematics required. Examples of accelerated mathematics programs of study include corequisite courses (see definition in [Chapter 6 of IMPACT](#)) and flex-start/fast-track (i.e., 6-week, 8-week, 10-week).

B		(0) Baseline	(1) Beginning	(2) Developing	(3) Accomplished	(4) Exemplar
6	Use of retention data to improve student persistence	Data are not used	Data are collected, but are not used in any clear way	Data are used in a coordinated capacity to improve persistence	Data are used in a coordinated and consistent way across the areas of the program to improve persistence	Data are used in a coordinated and consistent way with strategies in place for continuous improvement

Justification B6 (Required):

V. DIVERSITY, EQUITY, AND INCLUSION

CRITERION A3 (Curriculum): Diverse perspectives are represented in the curriculum

CONTEXT: This item allows you to examine whether your department's curriculum strives to maximize varied voices and to highlight contributions from a broader body of URG mathematicians and mathematics educators. This may help your department reflect the diversity of your student population. It has been established that students become more engaged when they can recognize themselves within the curriculum and when they make connections between the curriculum and their lives ([Gutierrez, 2011, pp. 17-33](#)), increasing their sense of belonging ([Schinske et al. 2017](#); [Yonas et al. 2020](#); [Sheffield et al. 2021](#); [Aranda et al. 2021](#)). It is important that instructors include multiple contributions from diverse scholars in the discipline; a single example of a URG contributor does not speak to this rubric criterion.

The following sources provide information to assist departments with this criterion: [Multicultural Mathematics Book Recommendations](#), [Testimonios: Stories of Latinx and Hispanic Mathematicians](#), [She Does Math!](#), [How Do We Make Math Class More Inclusive of Trans and Non-binary Identities](#), [Culturally Responsive and Inclusive Curriculum Guides](#), and the MAA's [Living Proof: Stories of Resilience Along the Mathematical Journey](#). While the levels of accomplishment for this criterion do not mention the value of critiquing the absence of diverse contributors, these discussions are also important for student development.

A		(0) Baseline	(1) Beginning	(2) Developing	(3) Accomplished	(4) Exemplar
3	Diverse perspectives are represented in the curriculum	Diverse perspectives are not represented in courses.	Diverse perspectives are represented in few courses.	Diverse perspectives are represented in some courses.	Diverse perspectives are represented in many courses.	Diverse perspectives are represented in most courses.

Justification A3 (Required):

V. DIVERSITY, EQUITY, AND INCLUSION

CRITERION B2 (Assessment): Perceptions of equity and inclusion (climate data) are assessed annually

CONTEXT: Student perceptions of equity and inclusion are related to campus and department climate. Climate surveys can include internal or external instruments that evaluate perceptions of equity and inclusion. Measurements of inclusion often reflect the sense of belonging *all* students, faculty and staff feel, irrespective of their identities. These surveys can reveal hidden feelings of exclusion and provide evidence of the effectiveness of actions taken to improve equity and inclusion. Offices of Institutional Research/Institutional Effectiveness or Diversity and Inclusion should be consulted first to check for the possibility of extant data and to help with supplying data and ways to develop strategies based on these data to foster improvements. In the absence of centralized climate surveys, some departments may benefit from creating their own surveys, vetted by a DEI expert ([Anderson, 2020](#)), or gathering qualitative data (e.g., conducting focus groups) to gather information about the campus or gathering qualitative data (e.g., conducting focus groups) to gather information about the student experience that can possibly inform the student success metrics.

A variety of external surveys are available, such as the [Collaborative on Academic Careers in Higher Education \(COACHE\) Faculty Job Satisfaction Survey](#), the [Higher Education Data Sharing Consortium \(HEDS\) Diversity and Equity Campus Climate Survey](#), and the [Center for Community College Student Engagement](#). While the national surveys mentioned are regularly used at the college level, this criterion, in part, is looking at whether the results of these surveys are provided to departments, and once received by departments, are used by them to drive change.

B		(0) Baseline	(1) Beginning	(2) Developing	(3) Accomplished	(4) Exemplar
2	Perceptions of equity and inclusion (climate data) are assessed annually	Climate data are not collected, or if collected, are not assessed.	Climate data are reflected upon annually and faculty are exploring ways to address disparities in equity and inclusion.	Department examines climate data annually to make changes and attempt to identify the root causes of disparities.	Department examines climate data annually to make changes. Changes are implemented to address the root causes of disparities in equity and inclusion.	Department uses climate data collected by the institution annually. Changes are implemented to address the root causes of disparities in equity and inclusion. Gaps in data are identified and additional instruments are considered (either internal or external) to gather data on inclusion specific to the department's constituents.

Justification B2 (Required):

VI. PROFESSIONALISM

CRITERION A3 (Faculty Engagement): Faculty engagement at conferences and other professional development opportunities related to STEM education reform

CONTEXT: This criterion addresses the extent of faculty member professional development and engagement with education reform. Examples of events that faculty members might attend, focused on mathematics education and its reform, include AMATYC, ASA, MAA, NCTM, etc. This is not an exhaustive list as there are many other regional and national conferences, meetings, and workshops focused on mathematics undergraduate education.

A		(0) Baseline	(1) Beginning	(2) Developing	(3) Accomplished	(4) Exemplar
3	Faculty engagement at conferences and other professional development opportunities related to STEM education reform	Faculty do not attend conferences or workshops related to reform	A small number of faculty actively participate in national conferences and other professional development opportunities	Some faculty actively participate in national conferences and other professional development opportunities	Many faculty actively participate in national conferences and other professional development opportunities	A significant majority of faculty regularly actively participate in national conferences and other professional development opportunities and participate in dialogue on STEM reform

Justification A3 (Required):

VI. PROFESSIONALISM

CRITERION B3 (Faculty Implementation): Alignment of learning goals, learning activities, and assessments

CONTEXT: This criterion pertains to the degree to which instructors have intentionally aligned their learning goals, activities, and assessments. These should be tied to a department vision that exemplifies national reform efforts. One possible strategy for such alignment is ‘backward design.’ With backward design first establish learning goals informed by the vision. Next develop measures that demonstrate that the learning goals were met. Finally, design activities so students can meet these learning goals. Evidence of success in this area would be documents that show how learning goals align with activities and assessments and with the department vision.

B		(0) Baseline	(1) Beginning	(2) Developing	(3) Accomplished	(4) Exemplar
3	Alignment of learning goals, learning activities, and assessments	No courses align learning goals, activities, and assessments	Few courses align learning goals, activities, and assessments	Some courses have well-aligned learning goals, activities, and assessments	Many courses have well-aligned learning goals, activities, and assessments	Most courses have well-aligned learning goals, activities, and assessments

Justification B3 (Required):

VII. CLIMATE FOR TRANSFORMATION

CRITERION A4 (Attitude toward Transformation Initiatives): Attitude of department faculty toward state and national transformation initiatives in mathematics education

CONTEXT: This criterion addresses the degree to which the faculty are aware of, have read about, and acts on national recommendations concerning mathematics education. State initiatives may be created by state-wide task forces, steering committees, forums, or summits. National initiatives may be from national mathematics organizations included in the [Conference Board of the Mathematical Science](#)

A		(0) Baseline	(1) Beginning	(2) Developing	(3) Accomplished	(4) Exemplar
4	Attitude of department faculty toward state and national transformation initiatives in mathematics education.	Faculty are not aware of state and national initiatives or does not acknowledge these initiatives in mathematics education	Faculty have read about state and national transformation initiatives in mathematics education, but do not implement them (i.e. faculty is change averse)	Department faculty are aware of and discussing state and national transformation initiatives in mathematics education	Department faculty are discussing state and national transformation initiatives in mathematics education and establishing short-term action plans	Department faculty are implementing state and national transformation initiatives in mathematics education and establishing long-term action plans

Justification A4 (Required):

VII. CLIMATE FOR TRANSFORMATION

CRITERION C1 (Concrete Implementations Promoting Transformation): Mechanisms for collaborative communication on significant educational challenges

CONTEXT: This criterion addresses the degree to which stakeholders (faculty, staff, administrators, etc.) across the institution effectively communicate about nationally-recognized and institution-specific challenges and issues in mathematics education in the first two years of college. Such discussions might include how to address recommendations from national reports and studies, educational best practices, data on student outcomes, and measures of student success. Institution-specific data and issues might include DFW rates, retention, persistence, success of students from non-traditional and underrepresented backgrounds, and outcomes such as graduation rates, types of employment, rate of entry into additional educational programs, etc. For scores of 3 and 4, formal mechanisms such as committees, professional learning communities, or working groups that actively engage key stakeholders across the institution around these issues exist. An example of an evidence-based working group structure to promote change in higher education departments is the Departmental Action Teams model: <https://dat-project.org/>. To achieve a score of 4, discussions that identify significant disparities or issues must lead to changes in programs to address those concerns.

C		(0) Baseline	(1) Beginning	(2) Developing	(3) Accomplished	(4) Exemplar
1	Mechanisms for collaborative communication on significant educational challenges	There is little discussion of educational challenges that impact student success (e.g. retention, persistence, success of underrepresented students)	There is informal discussion of educational challenges that impact student success, but discussions include only a limited group of stakeholders with infrequent, irregular meetings	Informal discussion of educational challenges that impact student success includes the majority of college stakeholders, but there are no mechanisms for collaborative communication.	Formal communication mechanism (committees, professional learning community or working groups) exists for discussion of educational challenges that impact student success. The committee includes the majority of college stakeholders	Formal communication mechanism committees, professional learning community or working groups) exists for discussion of educational challenges that impact student success. The committee includes the majority of college stakeholders, who collaborate actively to make impactful changes

Justification C1 (Required):