About the NMP: Student Success Course Focus

Professional Learning Webinar
March 26, 2013

Hosted by Tom Connolly & Nancy Stano

an initiative of the Charles A. Dana Center and the Texas Association of Community Colleges
Outcomes of Today’s Webinar

- Participants will learn about the NMP
  - principles for reform of developmental and gateway math
  - Dana Center roles and responsibilities on the campus level
  - course sequence
  - course outcomes/objectives
  - structure of curricular materials

- Participants will gain more in-depth knowledge of the *Frameworks for Mathematics and Collegiate Learning* course
Why is large-scale reform necessary?

“Developmental math is a burial ground for the aspirations of myriad students.”

- Uri Treisman
  Executive Director, Dana Center

National data on developmental math

- 67% of community college students are referred to one or more developmental math courses
- 33% complete the developmental math sequence
- 20% complete a “gateway” math course
Large-Scale Reform Effort in Texas
*The New Mathways Project*
Dana Center & TX Association of Community Colleges

- Charles A. Dana Center at the University of Texas at Austin
  - Over 20 years of state and national leadership in mathematics education
  - Staff: math educators, policy experts, student success experts
  - Led original curriculum development of Statway and Quantway in partnership with the Carnegie Foundation

- Texas Association of Community Colleges
  - Represents all 50 community college systems
  - Represents community college interests in state policy and budgeting
An Integrated Approach to Working at Scale

TACC and college presidents posited that colleges had to take ownership of the reform agenda if it were to succeed.

TACC and college presidents unanimously agreed to enter a long-term agreement with the Dana Center to support the development of the NMP.

TACC and college presidents recognized that innovation and change at scale would be impossible without engagement and participation of faculty.

Faculty will continue to be engaged in every stage of development.

Faculty professional development is a cornerstone of our work.
Levels of Engagement – TX Community Colleges

CODEVELOPMENT PARTNERS
Participate in original development of materials and services; implement in Fall 2013; take a leadership role in supporting other colleges

ACTIVE LEARNING SITES
Implement within 1-2 years, preparing for implementation through a mentoring relationship with codevelopment partners

CAPACITY BUILDING SITES
Implement within 3-4 years, focused on informing faculty and building support
Dana Center Principles for Reform

A systemic approach to improving **student success** and **completion** by reforming developmental and gateway mathematics

1. Multiple pathways: Relevant and challenging mathematics content aligned to specific fields of study

2. Acceleration: Students complete a college-level math course more quickly than in the traditional developmental math sequence.

3. Intentional use of strategies to help students develop skills as learners

4. Curriculum design and pedagogy based on proven practice
The NMP Course Structure

- **Foundations of Mathematical Reasoning**
  - Taken concurrently (1 term)

- **Frameworks for Mathematics and Collegiate Learning**
  - EDUC 1300 or PSYC 1300

- **Quantitative Reasoning**
  - MATH 1332 (1 term)

- **Statistical Reasoning**
  - MATH 1342 (1 term)

- **STEM Prep Pathway**
  - (2 terms)
  - Currently in development

Students enter Calculus sequence

- **color legend**
  - non-transferable courses
  - transferable courses
Key Characteristics of NMP Courses

1. **Common entry point:** Students create a completion plan and select the appropriate math pathway through a structured process in the student success course.

2. **Pathways:** Create a coherent and consistent experience for students and reinforce retention across terms.

3. **Student success strategies:** Embedded in math courses to apply and reinforce concepts from the student success course.
Key Characteristics of NMP Courses

4. Instructor support: Strong embedded support to facilitate usability

5. College-level content: Integrated into the courses so that students are challenged and engaged from the first day of class

6. Course design: Supports the development of strong reasoning and problem-solving skills
Delivery and Costs of Curricular Materials

- All courses are classroom-based; face-to-face instruction
- Materials will be developed in an online platform*
  - Similar to an e-textbook, except that there will be lesson activities supported through the platform
  - Online homework and gradebook system
- Students pay a fee for access to the materials in lieu of a textbook
  - Fees are still TBD – we anticipate they will be lower than the cost of a standard textbook
## Timeline for Development and Implementation

<table>
<thead>
<tr>
<th>Courses</th>
<th>First Implementation</th>
<th>Publically Available</th>
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<tbody>
<tr>
<td>Frameworks for Mathematics and Collegiate Learning*</td>
<td>Spring 2013</td>
<td>Fall 2013</td>
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<tr>
<td>Foundations of Mathematical Reasoning</td>
<td>Fall 2013</td>
<td>Fall 2014</td>
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<tr>
<td>Statistical Reasoning</td>
<td>Spring 2014</td>
<td>Spring 2015</td>
</tr>
<tr>
<td>Quantitative Reasoning</td>
<td>Spring 2015</td>
<td>Spring 2016</td>
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<tr>
<td>STEM-Prep and bridge course</td>
<td>Spring 2016</td>
<td>Spring 2017</td>
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*The Frameworks for Mathematical and Collegiate Learning course will also be published in PDF form for open use.*
## Upcoming Professional Learning Opportunities

<table>
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<tr>
<th>Date</th>
<th>Time</th>
<th>Title</th>
<th>Intended Audience</th>
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| June 1   | posted online | Online Video Module  
*Introduction to Active Learning Principles in Mathematics Instruction* | All Faculty              |
| June 1   | posted online | Online Video Module  
*An Introduction to Mindset Factors in Student Success: Focus on Malleability of Intelligence and Effective Effort* | Mathematics Faculty      |
Frameworks of Mathematics and Collegiate Learning
Course Pillars & Outcomes
The NMP Course Structure

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  - Currently in development

Students enter Calculus sequence

- Orange boxes: Transferable courses
- Red boxes: Non-transferable courses
Characteristics of *Foundations & Frameworks* population

- Math identity
- Awareness of habits that impact learning
- Strategy use
- Application of math to their career field
- Connections to peers and campus resources
- Work, life, and school commitments
Four Content Pillars

- Build community and connect students to campus resources
- Develop and maintain motivation for college success
- Develop and use study strategies and skills
- Find direction in college
High Level Outcomes

- **Build community and connect students to campus resources**
  - Locate and use support center services
  - Make personal connections with peers and their instructor
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- Develop and maintain motivation for college success
  - Develop and pursue useful goals
  - Understand factors that contribute to motivation
  - Demonstrate a positive mindset toward learning and maintain motivation
  - Develop a process through which they change negative, self-defeating habits into positive habits
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- **Develop and use study strategies and skills**
  - Employ critical thinking skills when approaching challenging tasks
  - Demonstrate organization of time and study materials
  - Describe how to store and retrieve information from their memory
  - Demonstrate effective reading and note-taking strategies that enhance retention and comprehension
  - Distinguish effective test-taking strategies to be used before, during, and after taking a test.
  - Demonstrate written and oral communication that is appropriate to context and that effectively conveys meaning and logic
  - Use technology throughout the course
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- **Find direction in college**
  - Identify future college and career pathways
Frameworks outline and outcomes

Course outline and outcomes are detailed on our website at: www.utdanacenter.org

Higher Education »
   New Mathways Project »
      The New Mathways Project Curricular Materials »
         Frameworks of Mathematics and Collegiate Learning Course
Frameworks of Mathematics and Collegiate Learning
Course structure
Course structure – Overview by weeks

1. Welcome
   Build trust, foster a sense of community, and cover “survival” skills

2. Unfreeze
   Explore identity and motivation to encourage students to be open to changing habits and using different strategies

3. Build competencies
   Learn and immediately apply concepts

4. Make it “Stick”
   Revisit topics, explore topics individually, and plan for the future
Course structure – Weekly overview by thread

Build community and connections to campus resources

- Make personal connections with peers, their instructor, and other campus support personnel.
- Meet individually with academic advisors and career coaches/counselors

Develop and maintain motivation for college success

- Develop a process for creating smart habits
- Examine beliefs, attitudes, mindsets, and behaviors
- Create smart habits
- Focus on use of math in future career

Develop and use study strategies and skills

- Informal reflection on self and content
- Gain college learning experiences to build upon
- Learn and immediately apply memory, time management, effective reading, test preparation, test performance evaluation, and critical thinking skills.

Finding direction in college

- Introduce value and process of setting goals
- Meet individually with academic advisors and career coaches/counselors
Course structure – Weekly overview by thread

Build community and connections to campus resources

- Explore library resources
- Work in groups
- Discuss math in everyday life with community members

Develop and maintain motivation for college success

- Use personal strategies to monitor and manage attitudes, emotions, and thoughts when facing challenging academic tasks.

Develop and use study strategies and skills

- Learn and immediately apply memory, time management, effective reading, test preparation, test performance evaluation, and critical thinking skills.
- Demonstrate research and oral communication skills

Finding direction in college

- Identify future college and career pathways.
- Make meaningful plans for academic and career trajectories
Frameworks of Mathematics and Collegiate Learning
Overview of Sample Lessons
Lesson 13, Activity 1

What are some of the habits you have when reading your textbooks?

Jot down a few of your reading habits.

Then share with at least two neighbors.
Lesson 13, Activity 1

Important information is made available to us in the textbooks we use for our courses.

Pull out the textbook you brought to class. Glance though it for a few moments on your own.

Identify key features of your text that can help you identify what is important and learn the material.

Discuss in your success team:
- What is similar between texts?
- What is different between texts?
- What clues are available in our texts that can help us identify important information?
Lesson 13, Activity 1

Report out:

What did your team identify as clues that are available in your texts?

What similarities did you find?

What differences did you find?

Applying what you now know:

How can you use this information when studying?
Remainder of the lesson

Activity 2: Applying the SQ4R model to texts
Activity 3: Special math considerations

- How does reading in math impact time management? Motivation?
- Reading tricks and tips that may be counterproductive when reading in math.
Lesson 10
Metacognition; Financial Advisor Visit

Overview

In this lesson we revisit a topic, first introduced in lesson 2, concerning students’ beliefs about learning in general and their ability to learn (and even enjoy) math in particular. Students are prompted to reflect on the value of journaling as a means of thinking about their thinking (metacognition). This reflection leads into a Success Team activity in which students help each other identify the negative mental scripts that may be continuing to affect their motivation for some of their courses, hindering their success.

In the final part of the lesson, you introduce the guest speaker, a member of the financial advising staff who will (as with the academic advisor and career counselor who visited earlier in the semester) outline the value of mathematics in relation to the students’ planned careers, as well as offer advice and guidance on using resources available through the financial aid office.

| Week: 5 of 15 |
| No. of Lessons: 2 of 2 |
| Lesson Length: 75 minutes |
| No. of Activities: 3 |
| Supplementary Materials: Appendices A and B |
Key Concepts

**Attributions:** The explanations one gives for one’s outcomes. One dimension of attributions is that they are either internal (caused by something within oneself—e.g., believing that getting a D on a paper was due to one’s own poor planning), or external (caused by something outside oneself—e.g., believing the D was due to the instructor’s bad mood or unfair grading).¹

**Metacognition:** Psychologist John Flavell came up with the term to refer to the process now generally thought of as “thinking about thinking”: *metacognition* is the conscious knowledge a person has about how he or she learns and thinks.

**Self-efficacy** (also referenced in Lesson 5): A concept developed by social cognitive theorist Albert Bandura and others, concerning the beliefs we hold around how capably we can perform in certain situations (such as passing math tests) and how likely we are to achieve certain goals (such as graduating college in a timely manner). One’s sense of *self-efficacy*, then, includes judgments we make about our capabilities.²
Instructor notes – General structure

**Student Objectives**

Students will

- identify habits and behaviors that have previously interfered with successful academic performance.
- self-regulate and demonstrate metacognitive awareness by planning, monitoring, evaluating, and reflecting on their learning.
- discuss in class various support services available on campus with support service center representatives (such as the academic advisor, career advisor, financial aid representative).
Instructor notes – General structure

Resources and Preparation

1. **Background information**
   Become familiar with the terminology used in this lesson. Links with additional information on some of the topics are provided in footnotes.

2. **Entry logistics**
   Have the student attendance sheet prepared for the day.

3. **Make copies of the following materials for students:**
   - If you choose, create a handout to accompany the discussion on metacognitive knowledge and metacognitive regulation.

4. **Activity 1: The Value of Journaling**
   You may want to bring in copies of your own journals or ask students to make sure to have their journals in class during the discussion.

5. **Activity 2: Metacognition**
   There is mathematics-specific information embedded within this activity, including facts and principles associated with using estimation and general thought processes students can use to self-regulate while completing homework/application problems. It is important to understand how the math is an example of the metacognition concepts. You could come up with additional examples to help demonstrate these concepts as well.
To have metacognitive knowledge, including *declarative knowledge*, *procedural knowledge*, and *conditional knowledge*.

**Declarative:** Knowledge about yourself as a learner and facts

**Procedural:** Knowledge about how to do something

**Conditional:** Knowledge about when and why to do something
b. Apply these three kinds of knowledge to something students have already studied in their math class: Estimation. For each type of knowledge, more than one example is given. Depending on your comfort level with the math material, you could opt to give the first example and open discussion on additional, related examples. Alternatively, you could give all the examples provided.
**Declarative:** Knowledge about estimation includes the concept that context plays a large role in determining what an appropriate estimate is.

- **Some additional facts:** Estimation is a handy tool when you need a quick calculation and you do not need an exact answer. Estimation can also help you determine the reasonableness of an exact answer (if you need to calculate one).
**Procedural:** Given the problem: Estimate 25% of $76.89, one example of the estimation process is:

- Round (or approximate) $76.89 to $80 and rewrite 25% to 1/4. Calculate the final answer by multiplying $80 by 1/4. Final answer: $20
- Alternatively, you could Round (or approximate) $76.89 to $80 and rewrite 25% to 1/4. Calculate the final answer by dividing $80 by 4. Final answer: $20

**25% being equivalent to ¼ is another example of declarative knowledge as is the fact that dividing by 4 is equivalent to multiplying by ¼. ***
Instructor notes – Mathematics within content

**Conditional:** Given the problem: “You are budgeting for grocery spending next week and you found that last week you spent $93.17 at the grocery store. You had friends over to watch your favorite football team play one day last week and since you will not be the host of this week’s gathering, you anticipate needing fewer groceries for the week. What should you estimate as grocery spending next week?

**One example:**

- Round $93.17 to $100.00. Round up to be sure to give yourself a cushion. (This is an example of conditional knowledge: You could have rounded down to $90, but then you may end up shorting yourself on your budget.)
- Assess that 15% of that spending was due only to the visitor expenses; therefore you anticipate only needing 85% of what you spent last month in the coming month. (This is an example of conditional knowledge. You could have set this number higher or lower, but you used information about the situation to determine this number. An example of declarative knowledge is that 100% – 15% is 85%.)
- Calculate the final answer by multiplying $100.00 times 0.85. Final answer: $85
You need different types of knowledge to complete your math assignments. Doing your homework (actually going through the process of doing and completing the problems) can help you build all three types of knowledge. Instructors need to make sure you gain all three types of knowledge for the subjects you are studying. They do this by asking many different types of questions on quizzes and exams.
Appendix B: Guidelines for Financial Aid Presentation

Below are topics for discussion, provided here for guidance.

- What is the purpose of the financial aid office?
- Where can I find information online about your office?
- How many financial aid counselors are there? Will students be assigned one who will see them throughout their college career?
- What types of financial aid are available? (need based versus merit based, emergency, scholarships, grants, loans, etc.)
- Does your office have resources to help students find employment on campus?
- How do students apply for financial aid?
- How can the financial aid office help students find and apply for aid?
- What are some financial aid deadlines to be aware of?
- When are your busiest times of the year?
- What events, if any, does your department run throughout the semester?
Summary

• Rationale for the project
• Status update
• Course structure and pillars
• Lesson structure
• Sample lessons
• Questions?
Contact Information

- General information about the Dana Center: www.utdanacenter.org
- Higher Education work: www.utdanacenter.org/higher-education/
- To receive monthly updates about the NMP, contact us at: mathways@austin.utexas.edu
Staff Contacts

- Amy Getz (general project issues): getz_a@austin.utexas.edu

- Connie Richardson (math course development): cjrichardson@austin.utexas.edu

- Nancy Stano (student success course development): nk.stano@austin.utexas.edu

- Tom Connolly (professional learning opportunities): tjconn@austin.utexas.edu

- Jenna Cullinane (policy, transfer, articulation): jenna.cullinane@austin.utexas.edu

- Erica Moreno (website, materials, information about events): ericamoreno@austin.utexas.edu
About the Dana Center

The Charles A. Dana Center at The University of Texas at Austin works with our nation’s education systems to ensure that every student leaves school prepared for success in postsecondary education and the contemporary workplace.

Our work, based on research and two decades of experience, focuses on K-16 mathematics and science education with an emphasis on strategies for improving student engagement, motivation, persistence, and achievement.

We develop innovative curricula, tools, protocols, and instructional supports and deliver powerful instructional and leadership development.