



**Advancing the Success of
Community College
Students –
New Developmental
Mathematics Pathways**

Richelle (Rikki) Blair
OMSC Meeting
May 14, 2010

“My mama always said life was like a box of chocolates. You never know what you're gonna get.”



But in 2010, one thing for certain...

**what we bite into
will have a
quantitative center!**



Algebra class will be important to you later in life because there's going to be a test six weeks from now.



**Not
Any
More!**

All that's important to you
later in life because there's going to be a
test six weeks from now.

As you know...

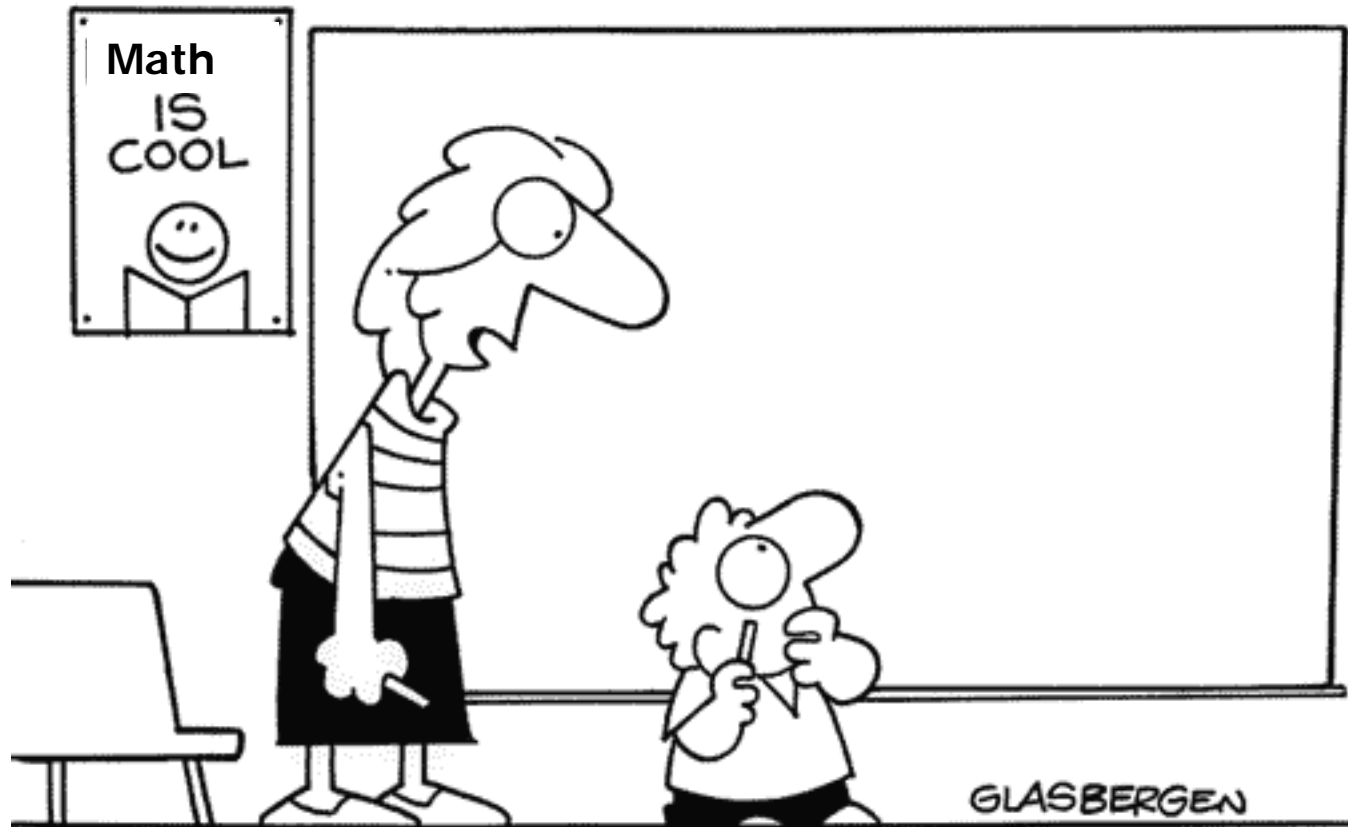
Our students are
different than they
used to be...

Today's Students are Digital Natives



**The number of text
messages sent and
received EVERY DAY**

**exceeds the
population of
the planet!**



**There aren't any ICONS.
It's a chalk board!**

Today's students are Learners by Exploration

- They learn by **doing**, not by reading the manual or listening to lectures.

Oblinger, D.G. & Oblinger, J.L. (Eds) (2005). *Educating the Net Generation*.
Boulder, CO:EdUCAUSE. An EdUCAUSE e-book:
<http://www.educase.edu/educatingthenetgen/>.

They think differently...



For today's students,
learning and
knowing
depends on **practice**
***And* participation.**



They...

- can shift their attention rapidly from one task to another.



They...

- are able to respond quickly and expect rapid responses in return.



They...

- prefer to work in teams.

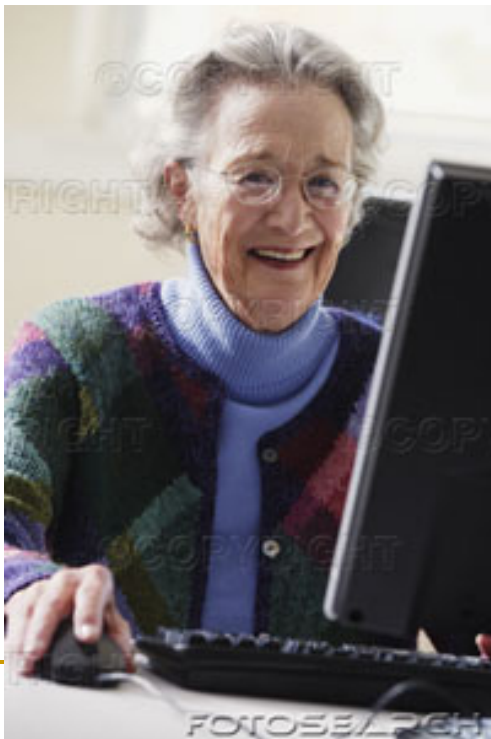


They are **NOT**
Attention Deficit
(ADD)



The DISCONNECT

Most of us are **Digital Immigrants**



Or Digital Aliens



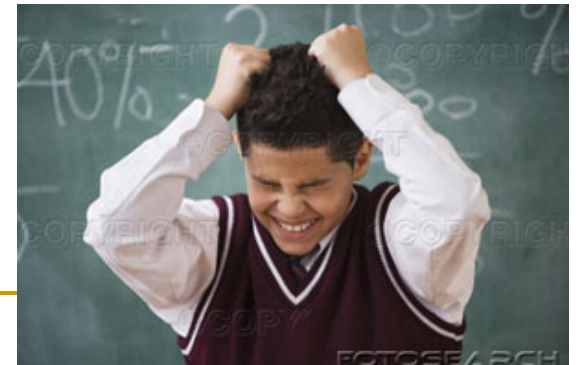
Like most
immigrants.....



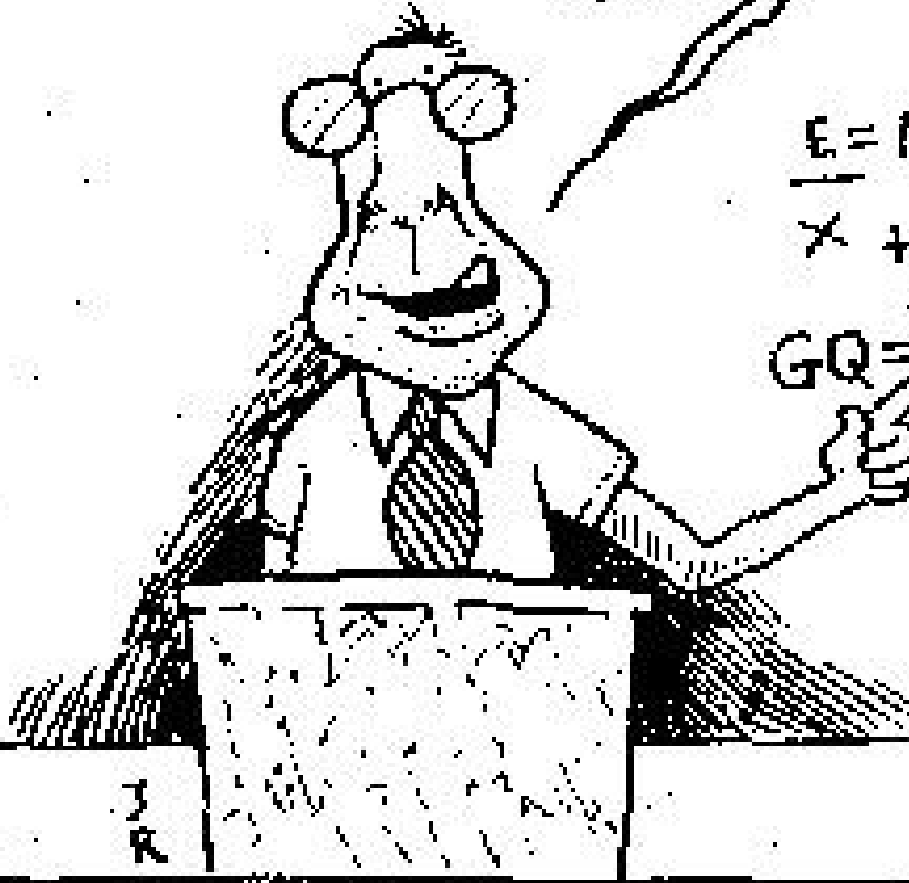
Digital immigrants
retain their
“**ACCENT**,” a foot
print in the past.

One of the Problems:

- Digital immigrant instructors are speaking an outdated language!



HELLO CLASS! ... THIS IS THE FORMULA FOR A TRIANGLE.

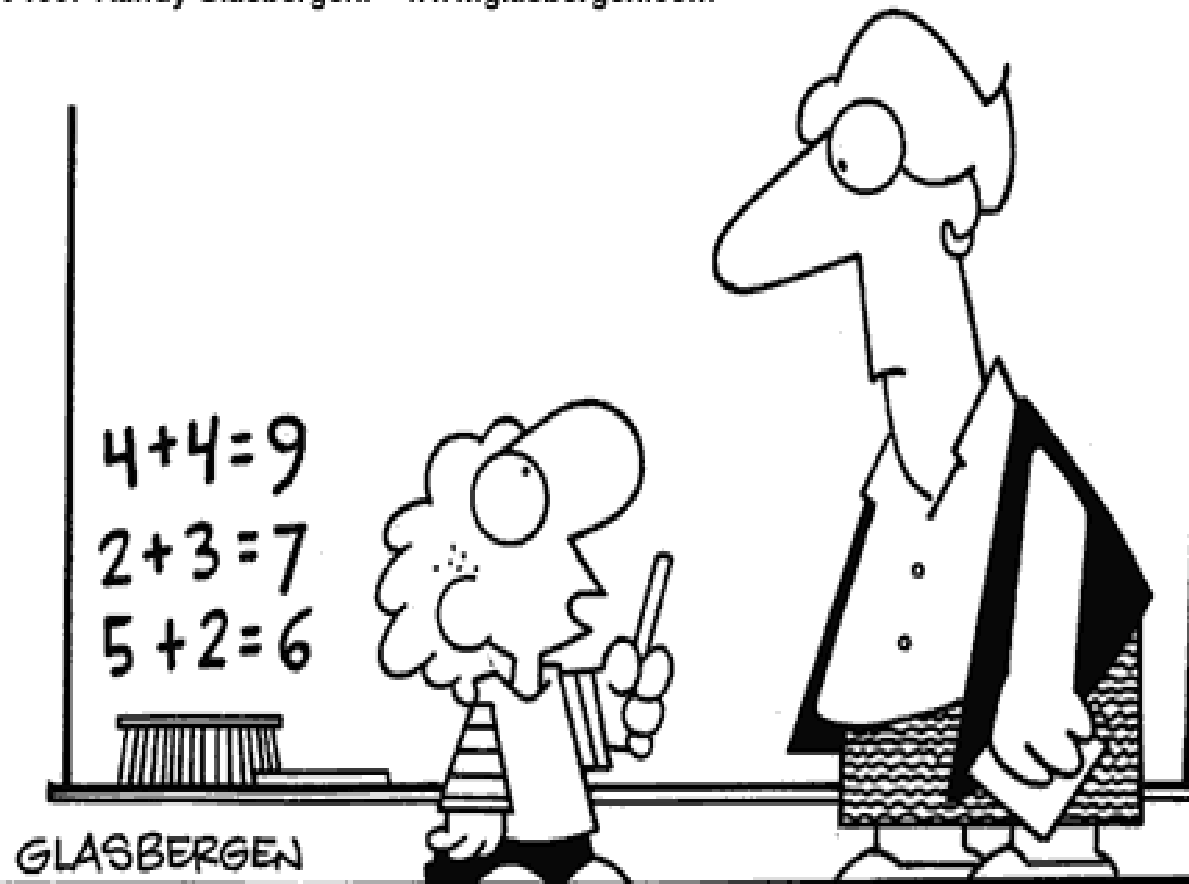


$$E = MD \odot \pi 2X^2 + 3 \text{ eggs}$$

$$X + \frac{0}{2} \frac{1}{2} \text{ truck} - \frac{37^3}{X - \odot}$$

$$GQ = 37 \text{ box} = \$ 0.3 + \frac{3}{4} \text{ of } \frac{2x}{6 \text{ pills}}$$

Copyright 1997 Randy Glasbergen. www.glasbergen.com



“My generation will be running the world soon. If we say $4+4=9$, then that’s the way it’s going to be!”

Could we respond better to the content **NEEDS** of the students, in addition to their learning characteristics?

What about the CURRICULUM?

A New Survey of Workplace Skills, Technology, and Management Practices (STAMP)

Telephone survey (2005)

N = 2,304: Employed wage & salary workers age 18
and over—English and Spanish language versions

Michael J. Handel, Department of Sociology, Northeastern University, m.handel@neu.edu. This research was supported by the National Science Foundation, the Russell Sage Foundation, and the Wisconsin Alumni Research Fund.

STAMP Survey Content

About 166 job-specific questions, 28 minutes average length

- **Cognitive skills:** *Math, Reading, Writing*
 - **Supervision, Autonomy, Authority**
 - **Computer and Other Technology**
 - **Employee Involvement**
 - **Job Downgrading**
 - **Job Satisfaction**
-

Table 2. Survey Items: Mathematics

At your job, do you:

- use math or numbers in any way (e.g., measure or weigh things, count things, work with money)
 - use addition or subtraction
 - use multiplication or division
 - do math using fractions, decimals, or percentages
 - use simple algebra to solve for unknown values
 - use more advanced algebra to solve complex equations
 - use geometry or trigonometry
 - use probability and statistics, such as correlations and regressions
 - use calculus or other advanced mathematics
-

Table 2. Survey Items: Mathematics

Math	
Any math	94%
Add/subtract	86%
Multiply/Divide	78%
Fractions	68%
<i>More advanced</i>	
Algebra I	19%
Geometry/Trig	14%
Statistics	11%
Algebra II	9%
Calculus	5%

DEVELOPMENTAL

Mathematics

Enrollments in

Two-Year Colleges

are GROWING!

Mathematics Enrollments in Two-Year Colleges

- 1,697,000 students enrolled in mathematics courses (2005)
- This is a 26% increase from 2000!

Lutzer, D.J., Maxwell, J.W., & Rodi, S.B. (Eds.). (2005). *Statistical Abstract of Undergraduate Programs in the Mathematical Sciences in the United States, Fall 2000 CBMS Survey*. Providence, RI: The American Mathematical Society.

Mathematics Enrollments in Two-Year Colleges

- 1,697,000 enrolled in math

- This is 47% of ALL students in 2006

Lutzer, D.J.,
Undergrad

**This is
47% of ALL
students in
higher education
math courses!**

of
Society.

Developmental Mathematics Enrollments in Two-Year Colleges

- 964,000 students enrolled in developmental mathematics courses (2005)
(Arithmetic, Elem Alg, Interm Alg., Geom)
 - This is a 21% increase from 2000!
-

Developmental Mathematics Enrollments in 2-Year Colleges

- 964,000
de
cour
(Arith

**This is a
57% of ALL
TYC math
students!**

- This
2000
se from

Mathematics Enrollments at Two-Year Colleges (2005)

Mathematics Course	Percent
Developmental Mathematics	57
Precalculus	19
Calculus	6.25
Statistics	7
Other mathematics courses	11

Reality check.....

- ✓ Only 8-21% who are referred to developmental mathematics in two-year colleges actually **COMPLETE** the sequence.
 - ✓ As many as 18-38% of all students placed into dev math **FAIL to ENROLL** in the first course.
-

Typical TYC Beginning Algebra Class

- Students who have **NEVER taken** algebra.
 - Students who took it before, were **successful**, and need just a review.
 - Students who took it before, were **unsuccessful**.
 - Student who have taken the course **twice or three times** before.
-

Typical TYC Beginning Algebra Class

- Students w
- S
- and
- Studen
- Stud
- three

**IS the
definition of
INSANITY!**

successful,

use the or

three

While Algebra II for
ALL is a lofty goal...


While

All

What we have is
Algebra II
FOREVER!

**There ARE many
Promising Initiatives To
Increase Success in
Algebra II at all levels**

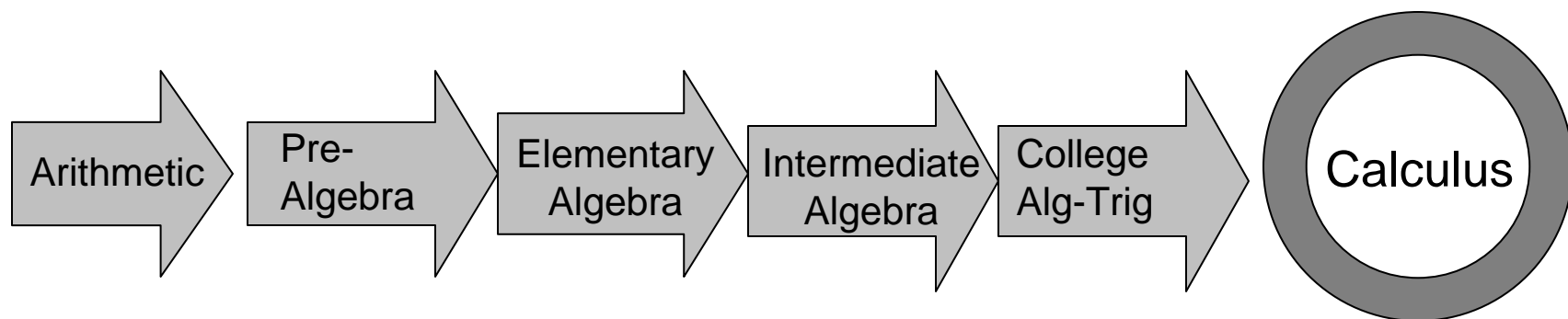
- Focus on instruction
 - Pockets of success
 - Have not created broad change
-



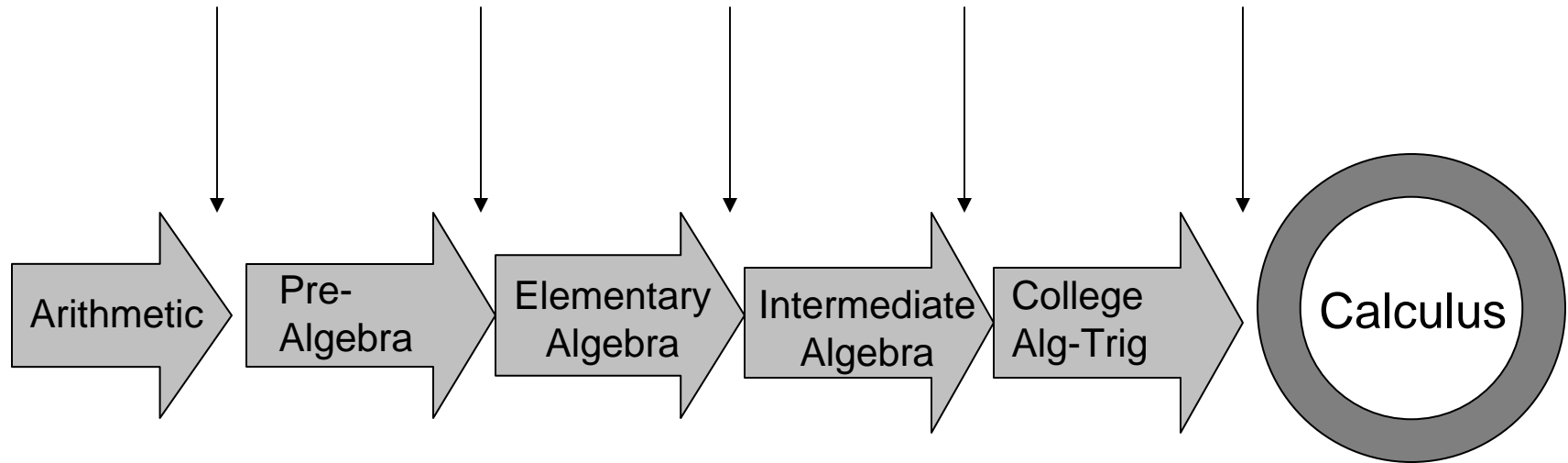
**But we aren't
really
addressing the
needs of ALL of
our students.**

**Perhaps there are
different goals.**

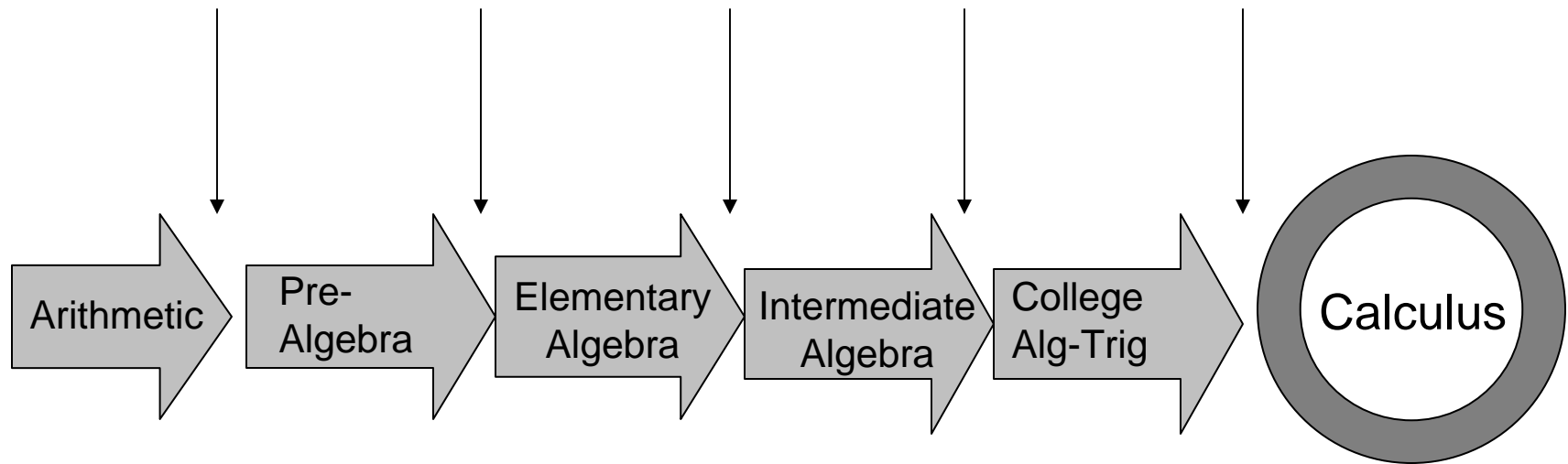
**Especially for non-STEM
students**



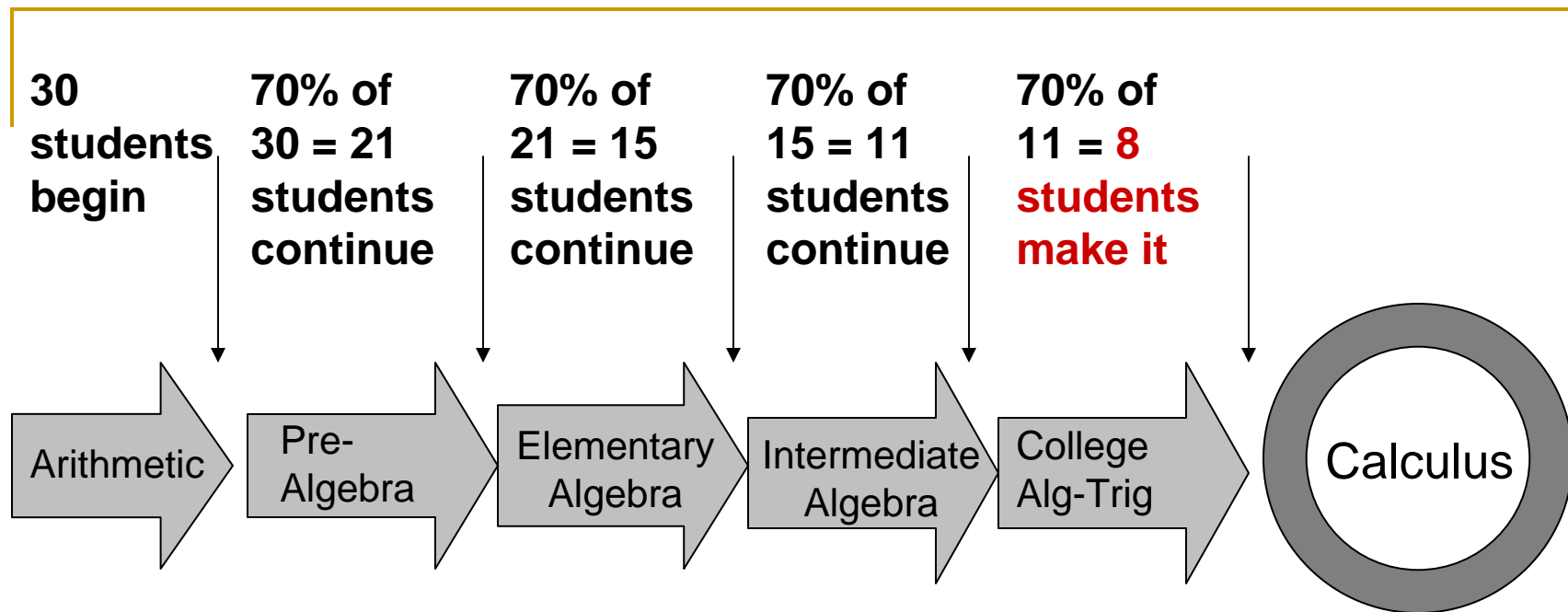
Mathematics programs are currently designed to prepare ALL students for Calculus.



For developmental mathematics students, there are MANY tension points to derail students.



Let's choose a goal of 70% as our success rate.



**Only 8 students make it to
College Algebra!
(and that's with rounding!)**

A multiplication problem at Los Medanos College (CA)

Data and slide from Myra Snell (faculty member at LMC)

DATA	<p>At LMC ~ 65-75% of entering students place at least two-levels below transfer-level in math.</p> <p>LMC success rates in algebra: 45-60%.</p> <p>LMC semester-to-semester persistence rates: ~ 60-70%.</p>
WHAT IF? Success rates = 70% Persistence rates = 80%	<p>EX: $70\% \text{ of } 100 = 70 * 80\% = 56$ $70\% * 56 = 39.2 * 80\% = 31.36$ $70\% * 31.36 \sim 22$ students</p>

Then 70% of 80% of 70% of 80% of 70% ~ 22% of the students beginning two levels below transfer will successfully complete a transfer-level math class. This is not good enough!

A multiplication problem at Los Medanos College (CA)

Data and slide from M. ... (faculty ... at LMC)



**This IS
insanity!**

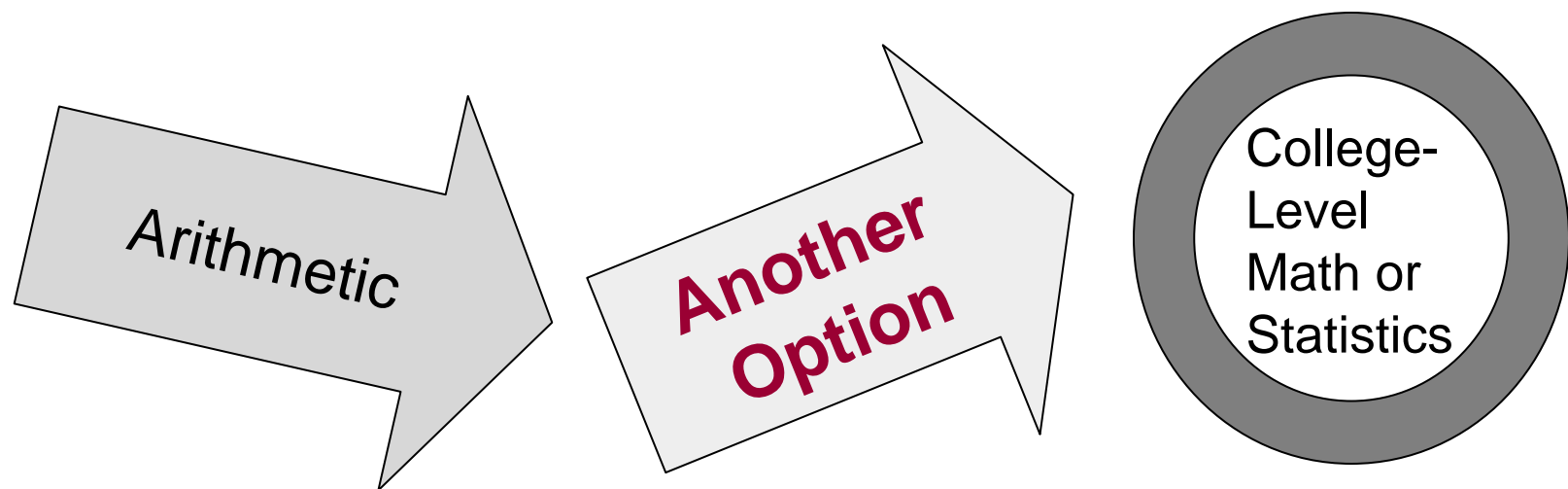
Then 70% of ... of ... 70% ~ 22% of the students beginning two levels below transfer ... successfully complete a transfer-level math class. This is not good enough!

36 70%*31.36~22 students



**What if we
changed the
CONTENT?**

What if we created a **NEW** pathway for the non-calculus bound students?



What if we identified the essential components of a Developmental Mathematics curriculum that could better serve our non-STEM students?

What if we identified the
essential components of a

Developmental

Mathematics

to

non

**What if we
changed the
NAME of the
course(s)?**

our

courses?

Pathways

A project proposed by the Carnegie Foundation for the Advancement of Teaching, the Charles A. Dana Center (UT at Austin), in collaboration with AMATYC and other professional societies.

Redesigning Developmental Mathematics – A New Vision

- **Communicate a new view: Not high schools mathematics - mathematics preparing college students for success**
 - **Change the culture for students and faculty**
 - **Develop mathematical habits of mind for students – a way of thinking and knowing mathematics**
-

Redesigning Developmental Algebra

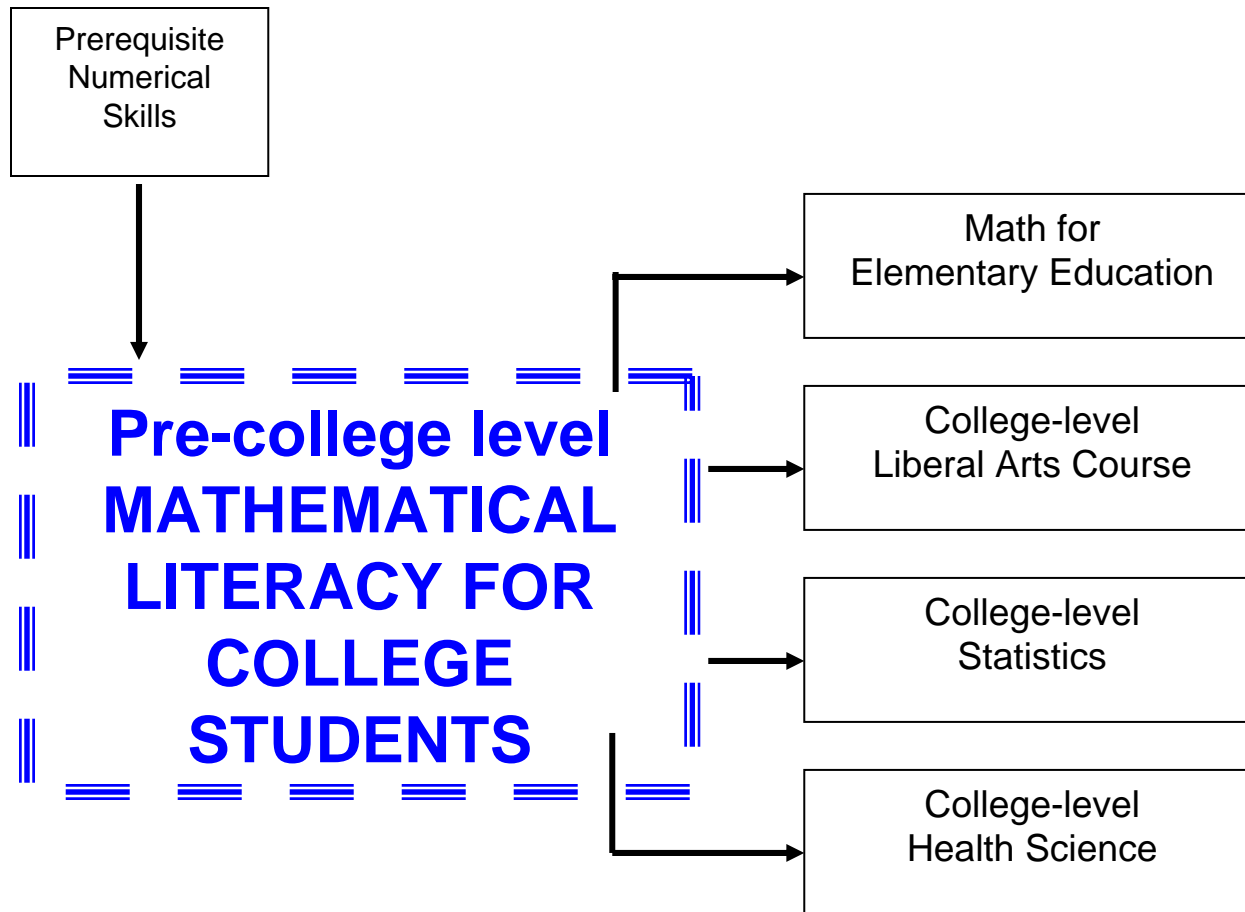
A New Vision

- **The New Vision is about “seeing” the world differently – analogous to the scientific method**
 - **An integrated approach to content and instructional strategies**
-

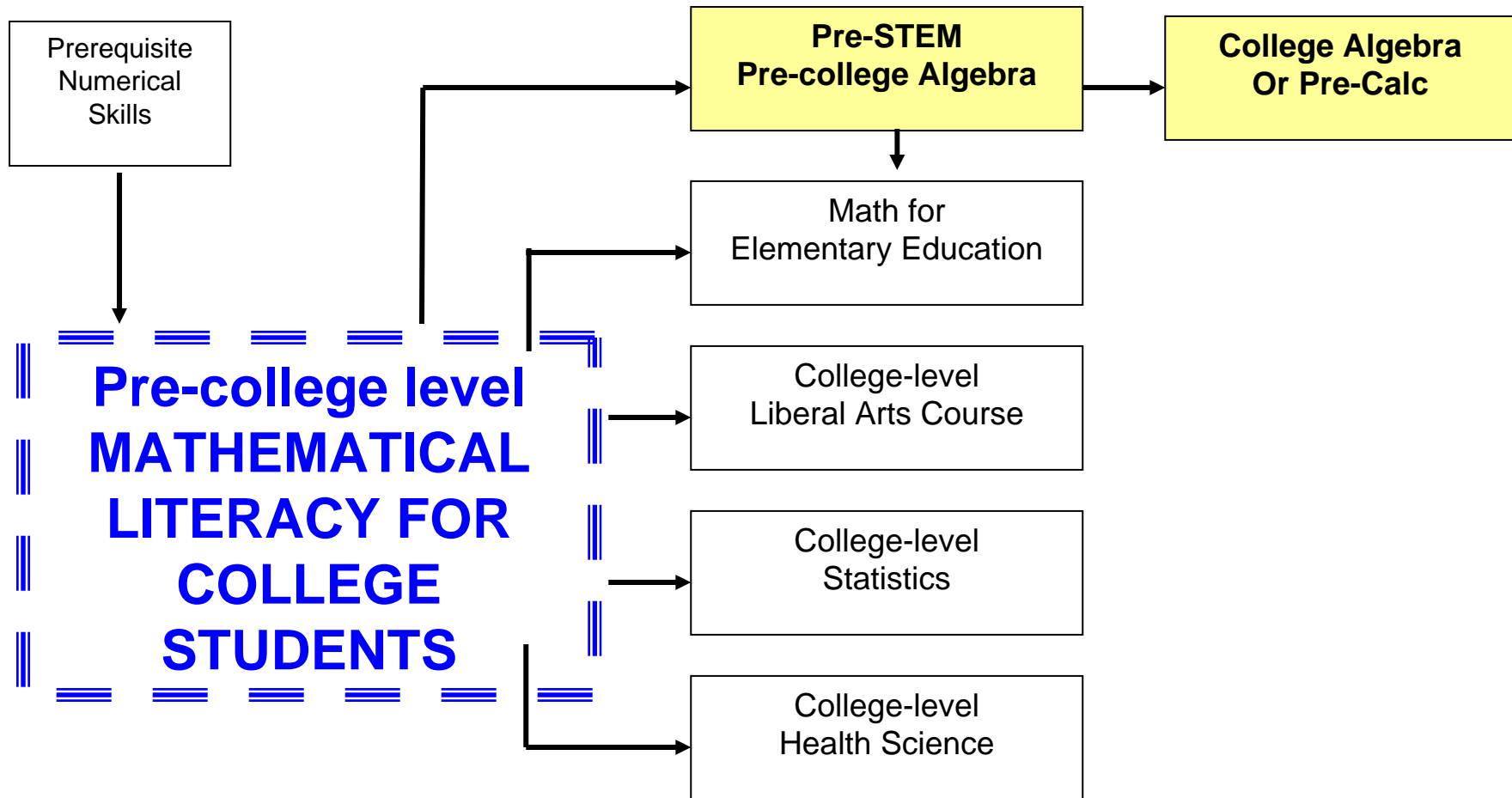
Mathway

is a one-semester problem-solving and critical thinking experience, followed by a college-level mathematics course in Quantitative Literacy/Reasoning, Mathematics for Liberal Arts, or a non-STEM College Algebra course.

Mathway



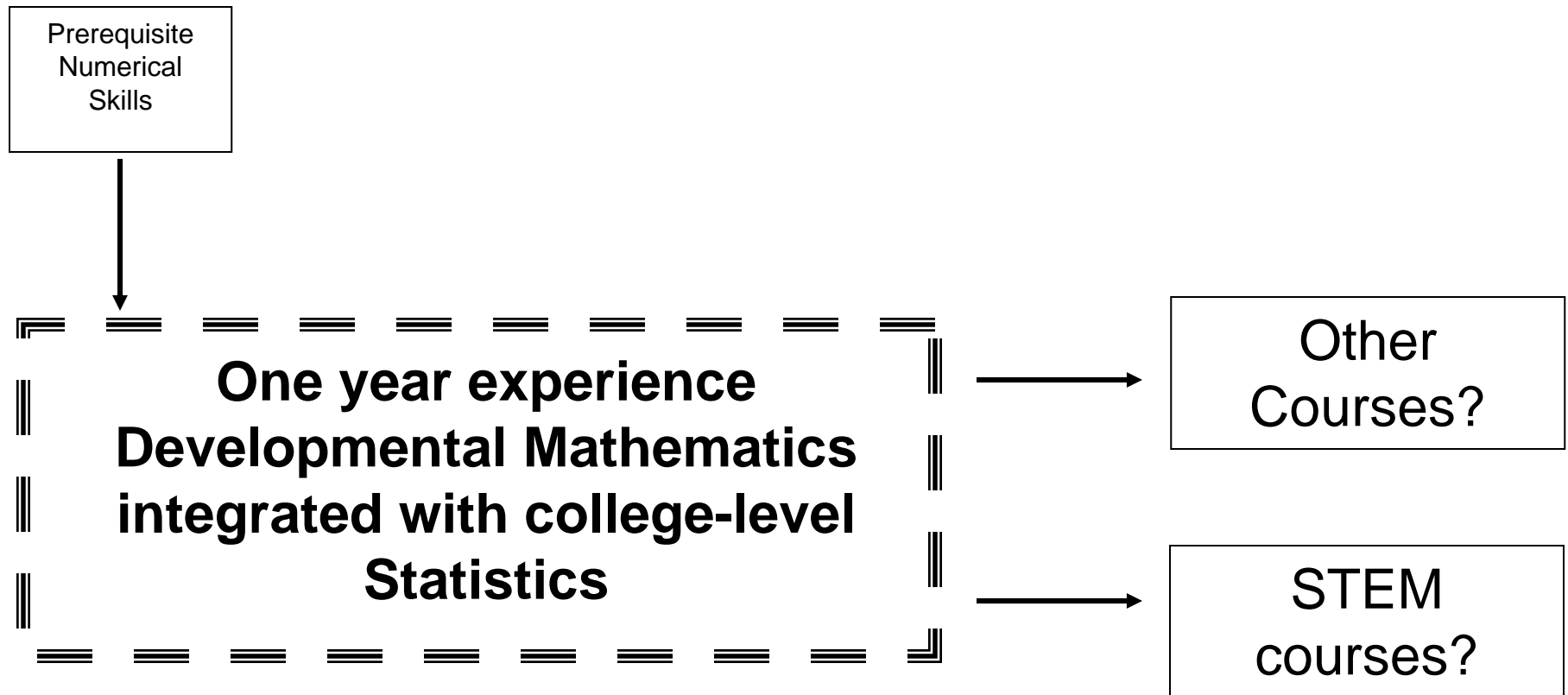
Or Build the STEM Program!



Statway

is a one-year pathway that culminated in college-level statistics, including the necessary arithmetic and algebraic concepts taught and applied in the context of statistics.

Statway



2009 – July 2010	Development of <i>Mathway-MLCS/Statway</i> student outcomes by faculty (reps from AMATYC, ASA, MAA, ASA, AMS, NCTM, CAUSE, NADE) Review by ARGs in professional organizations
Spring 2010	Identify potential <i>Mathway/Statway</i> college sites (12 <i>Statway</i> -Carnegie/8 <i>Mathway</i> -Carnegie and DMC)
July 26-30, 2010	<i>Statway</i> Summer Institute for faculty and administrators of selected college sites.
July 2010 – Fall 2011	Co-development of <i>Statway</i> instructional materials with the Dana Center and college faculty.
January 25-29, 2011	<i>Mathway-MLCS</i> Institute for faculty and administrators of selected college sites.
January 2011 – Fall 2011	Co-development of <i>Mathway</i> instructional materials with the Dana Center and college faculty.
Academic year 2011-2012	12 colleges offer <i>Statway</i> in 3 classes each college
Academic year 2011-2012	8 colleges offer <i>Mathway</i> in 3 classes each college in each semester

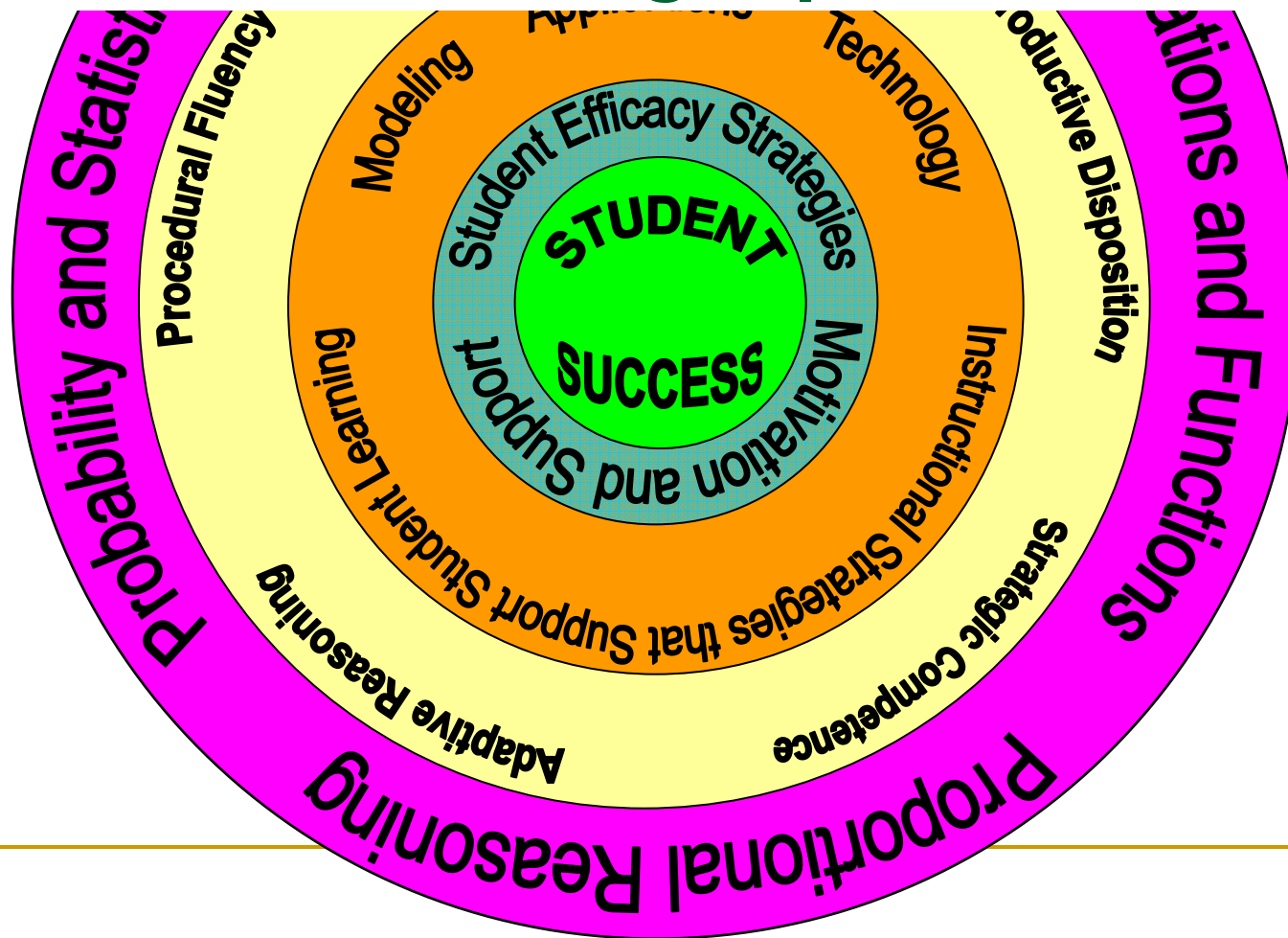
Continuous Improvement through college Collaboratories

Through 2011-2012 and after	Assessment, ongoing professional development, ongoing continuous improvement through college Collaboratories
-----------------------------------	---

**A 3D model - Integrated
Modeling/Quantitative
Reasoning**

**Mathematical Literacy
for College Students
(MLCS)**

Student Success is achieved in each lesson by integrating the components on each ring (spin).



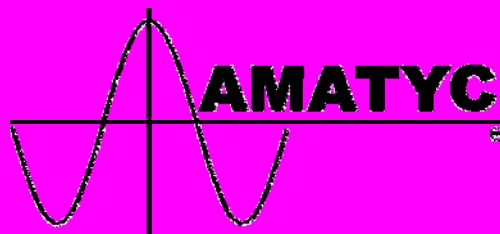
This is the
back side of
the biggest
circle.

New Beginnings in Developmental Mathematics

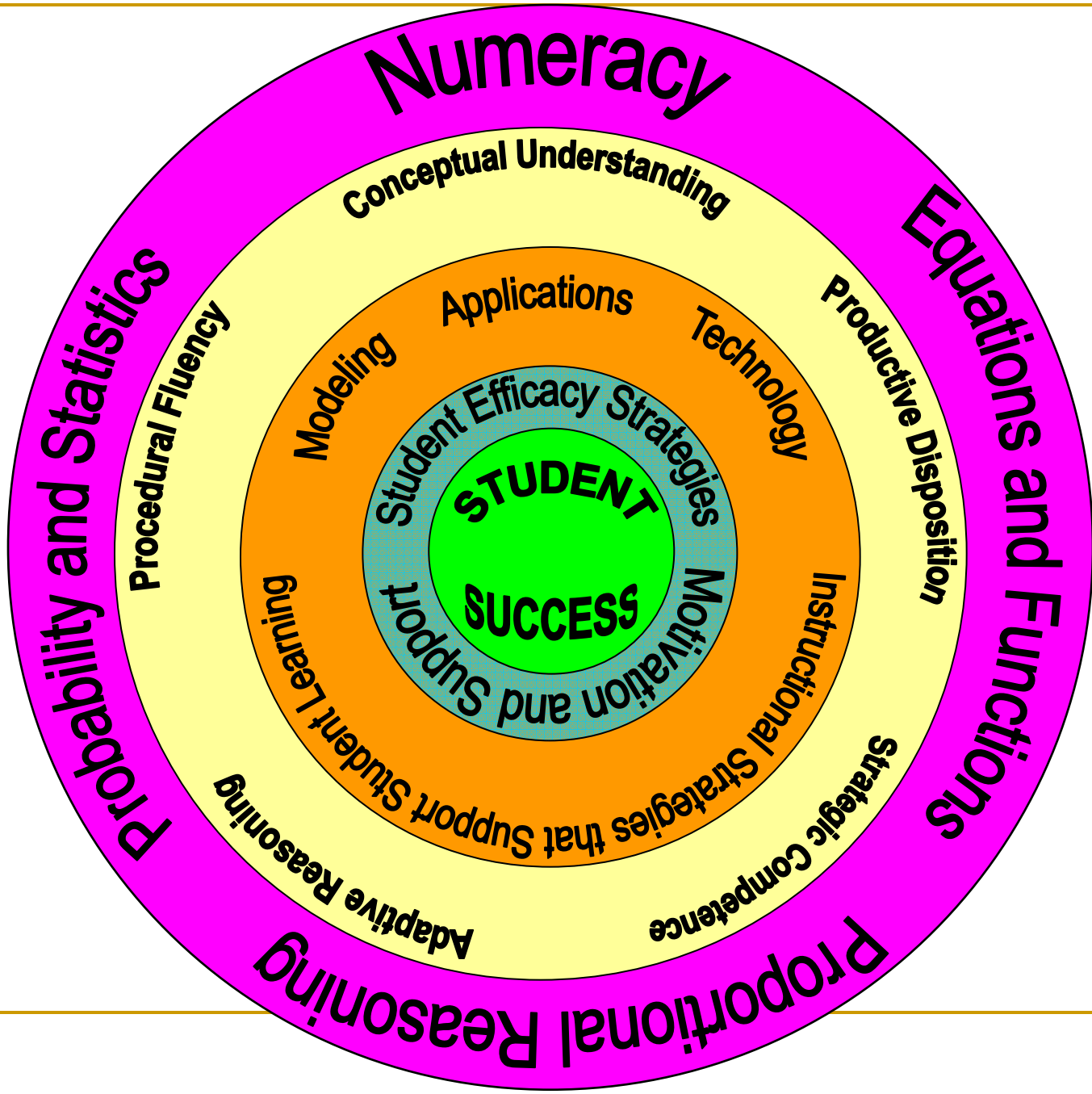
**Mathematical Literacy
for College Students**

Envision an integrated
instructional experience

**American Mathematical Association of
Two-Year Colleges**

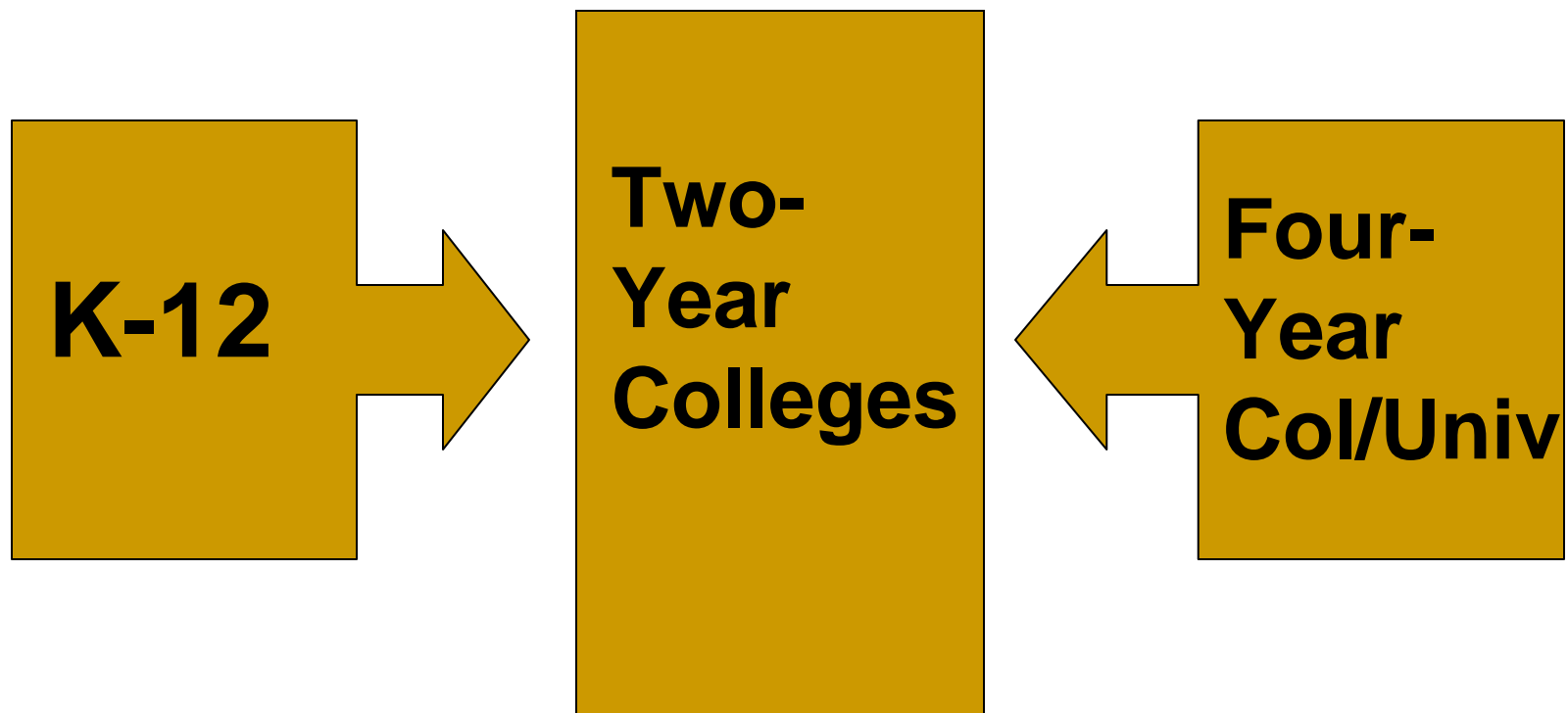


The New Life Project of the
Developmental Mathematics
Committee (DMC)

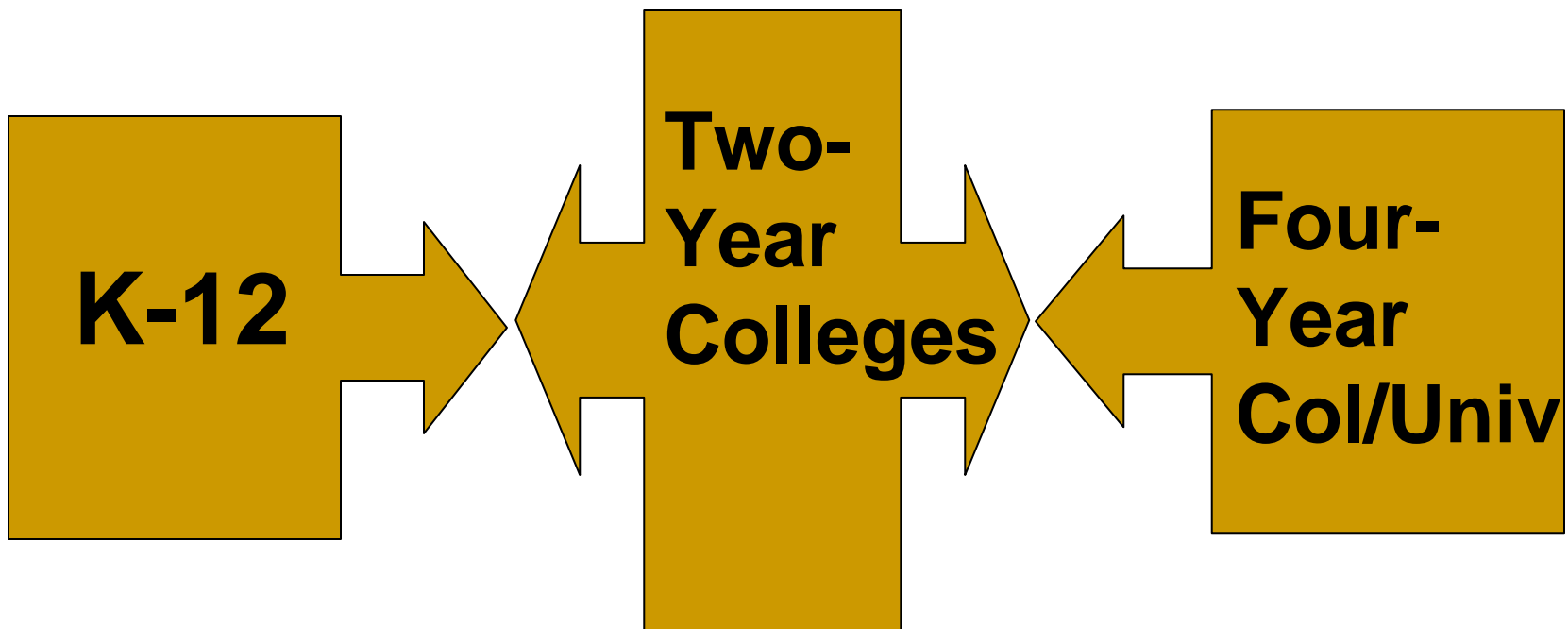


Community Colleges in the Middle

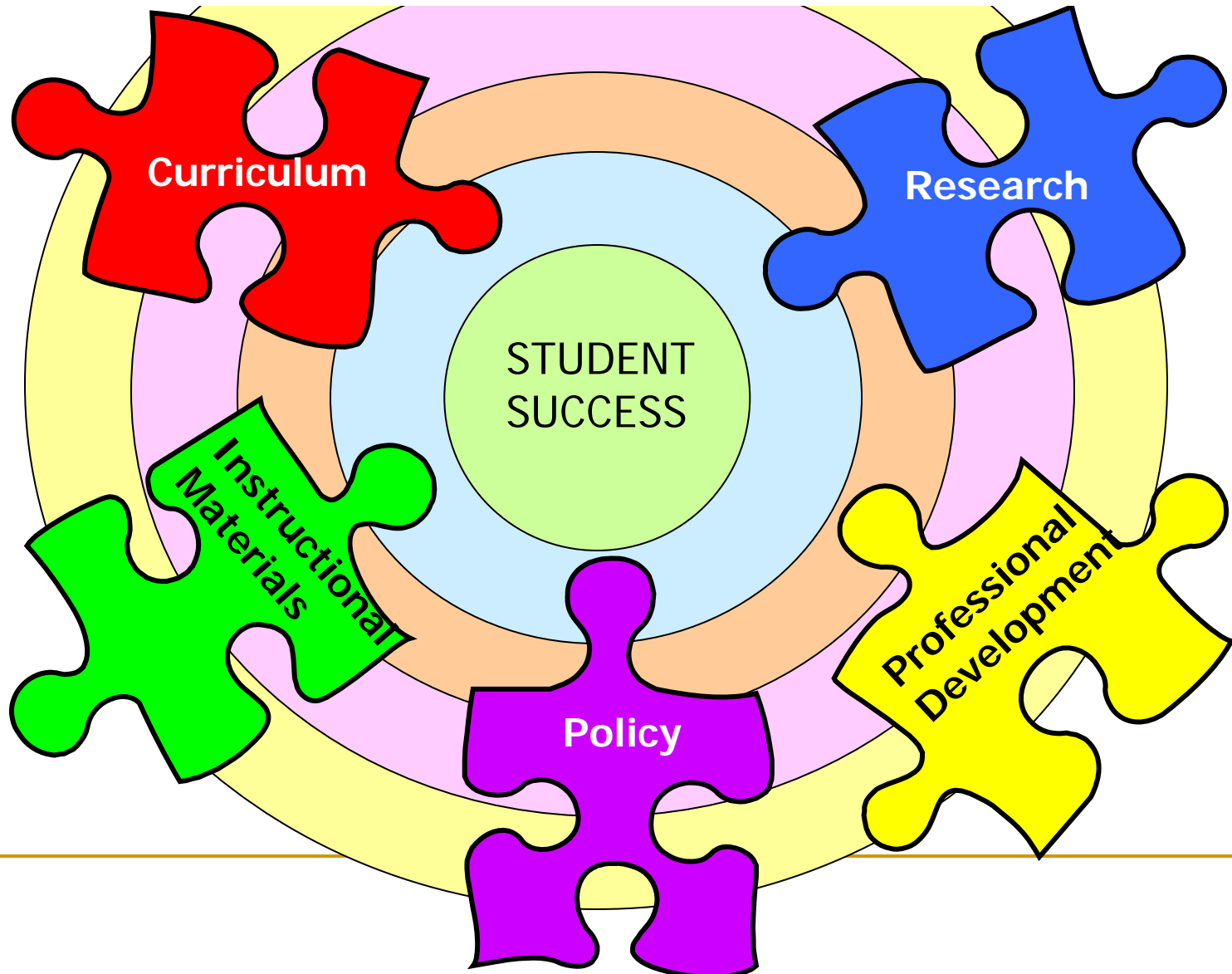
Influence from Both Directions



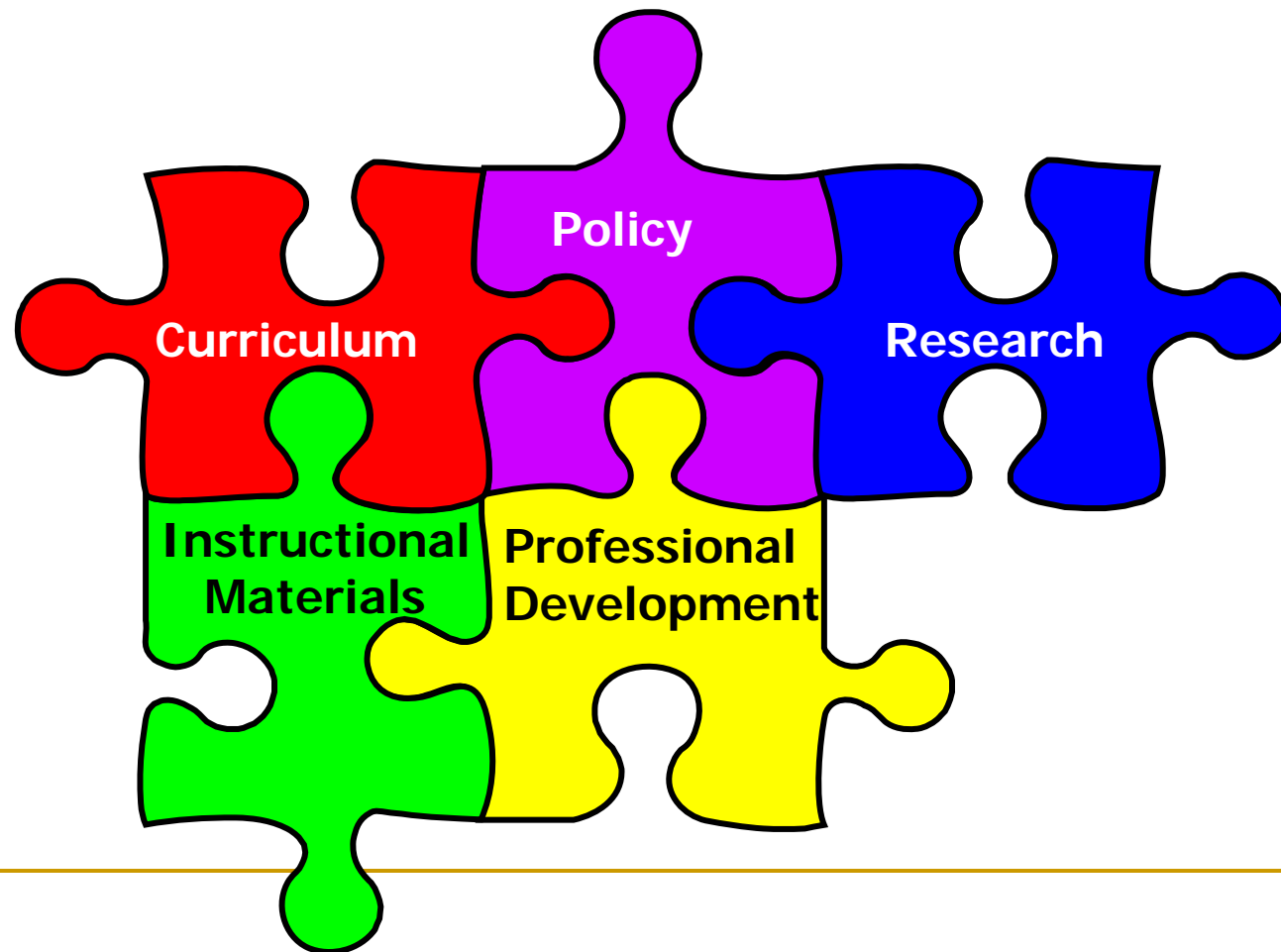
Community Colleges in the Middle Developing Curricula from BOTH Directions




The Vision has Lots of Pieces

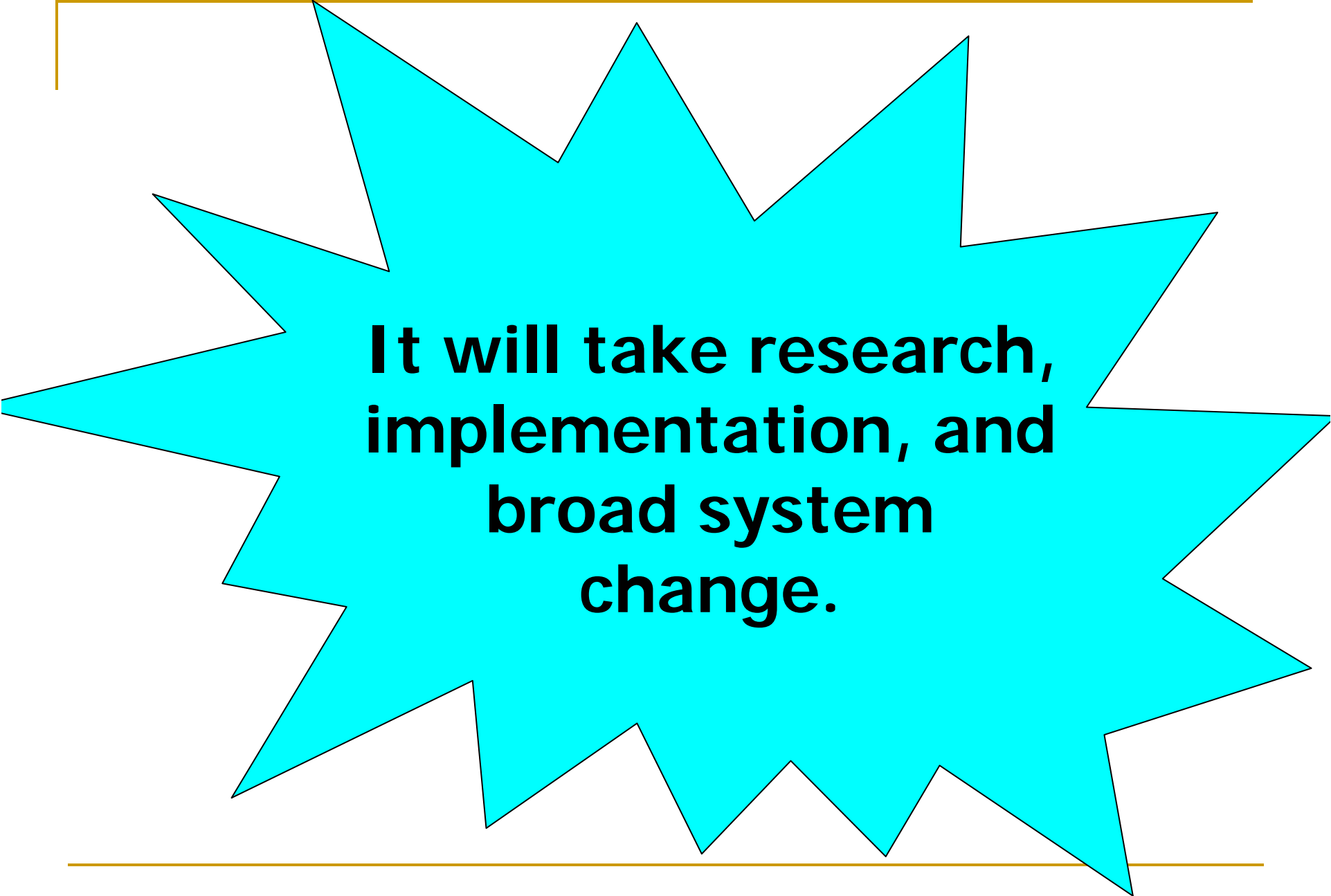


Making the Vision a Reality means Putting the Pieces Together



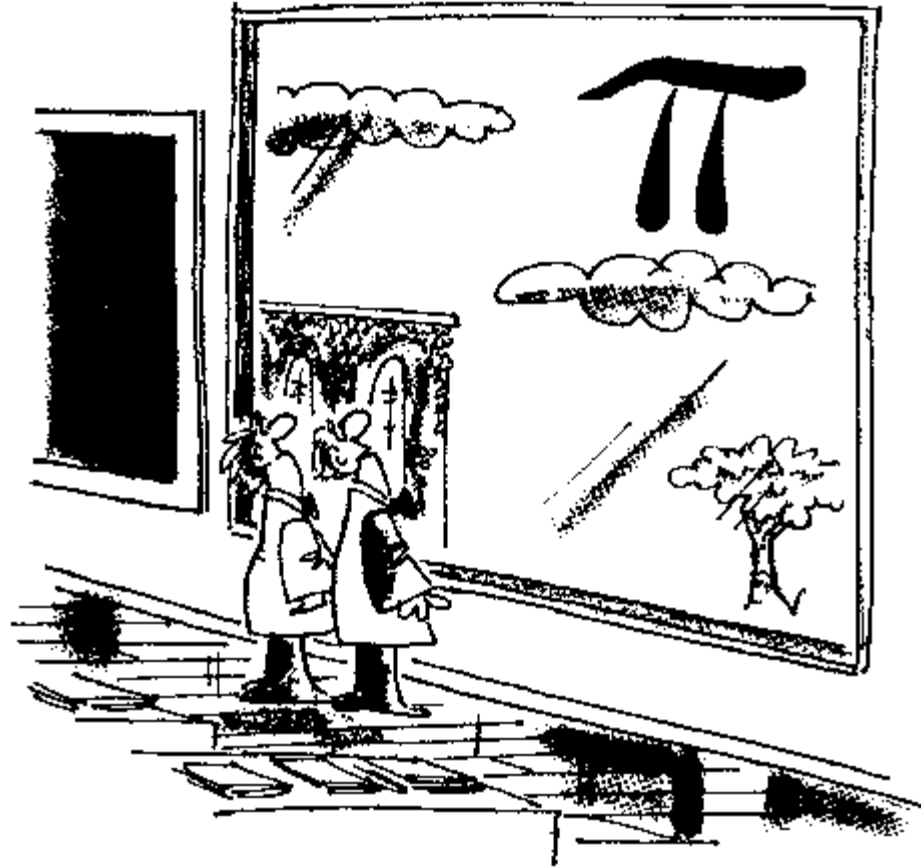


**None of us
can do it
alone!**



**It will take research,
implementation, and
broad system
change.**

Change and Improvements are NOT...



Change is challenging!

No one wants
change except
a wet baby,

but we need
to do it!



**Reflection is a key element
to learning.**

Reflection and
discussion



**Questions about
Mathway
or
Statway?**

Website:

www.rikkiblair.net

Email:

richelle.blair@sbcglobal.net

Thank you for
being here
today.



How can K-12, two-year colleges, and four-year colleges work together?

Dr. Brian Roget

**Assistant Director for
Mathematics**

Ohio Department of Education
