

# EMERGENCE AMID UNCERTAINTY

# APPLIED BACCALAUREATE DEGREES IN STEM TECHNICIAN EDUCATION

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Webinar  
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  - nontraditional students
  - technical hours to be transferred for credit

Arney, Hardebeck, Estrada, & Permenter (2006)

An AB degree is... “a baccalaureate degree program designed to meet the needs of nontraditional students by allowing technical hours to be transferred for credit to a baccalaureate degree” (p. 184).

# WHAT IS AN APPLIED BACCALAUREATE (AB) DEGREE?

- **Many definitions exist, focusing on different aspects of degree pathways**
  - nontraditional students
  - technical hours to be transferred for credit
  - workforce baccalaureate
  - applied and contextual learning
  - learning on the job
  - offered by associate degree-granting institutions

Walker & Floyd (2005)

AB degrees are... synonymous with “workforce baccalaureate” degrees, “which have been specifically created to meet identified workforce demands.” (p. 99) These baccalaureate degrees are offered by associate degree-granting institutions and use “applied and contextual learning methods and significant learning on the job” (p. 96).

# WHAT IS AN APPLIED BACCALAUREATE (AB) DEGREE?

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  - technical hours to be transferred for credit
  - workforce baccalaureate
  - applied and contextual learning
  - learning on the job
  - offered by associate degree-granting institutions
  - applied associate courses and degrees
  - once considered as 'terminal'
  - higher-order thinking skills and advanced technical knowledge and skills

Townsend, Bragg, & Ruud  
(2009)

An AB degree is... “a bachelor’s degree designed to incorporate applied associate courses and degrees once considered as ‘terminal’ or non-baccalaureate level while providing students with the higher-order thinking skills and advanced technical knowledge and skills” (p. 693).

# WHAT IS AN APPLIED BACCALAUREATE (AB) DEGREE?

- Variety reflected in practice

**AAS**

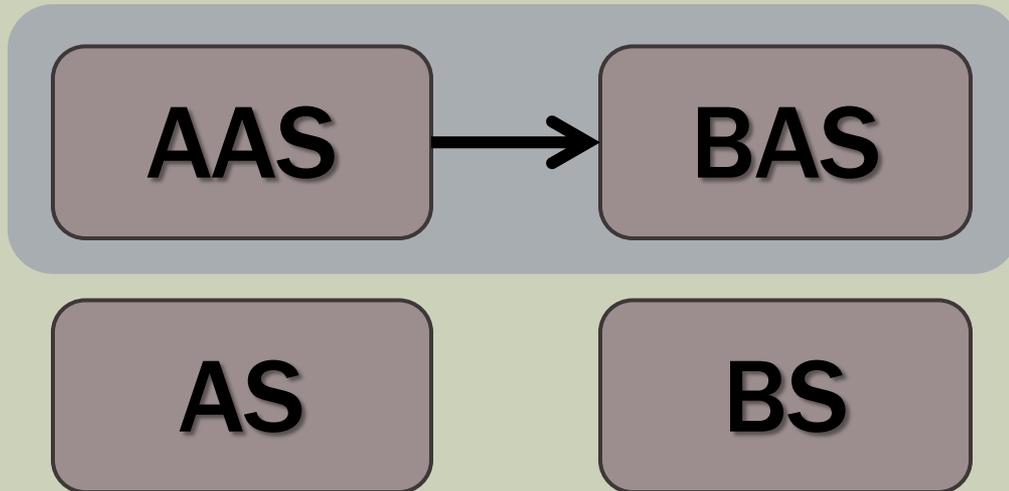
**BAS**

**AS**

**BS**

# WHAT IS AN APPLIED BACCALAUREATE (AB) DEGREE?

- Variety reflected in practice



## Example

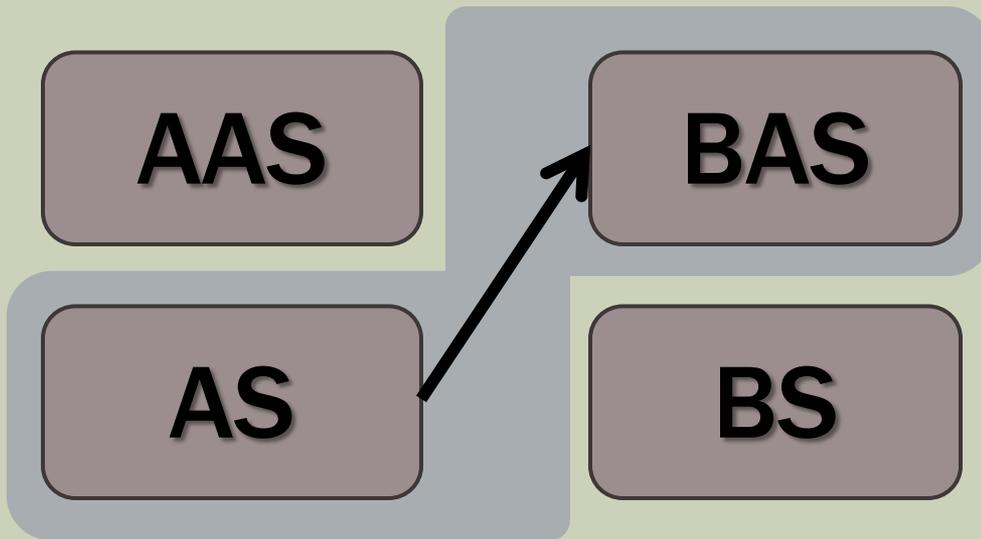
AAS in Nuclear Power Technology  
at Bismarck State College

transfers to

BAS in Energy Management  
at Bismarck State College

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- Variety reflected in practice



## Example

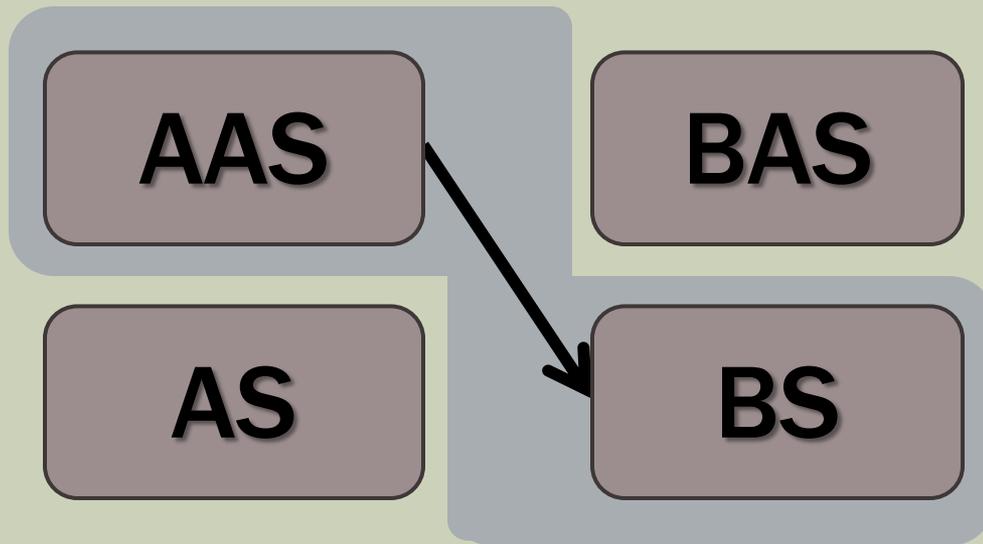
AS degrees in Computer Programming and Analysis at Valencia State College, Seminole State College, and Brevard Community College

transfer to

BAS in Software Development at University of Central Florida

# WHAT IS AN APPLIED BACCALAUREATE (AB) DEGREE?

- Variety reflected in practice



## Example

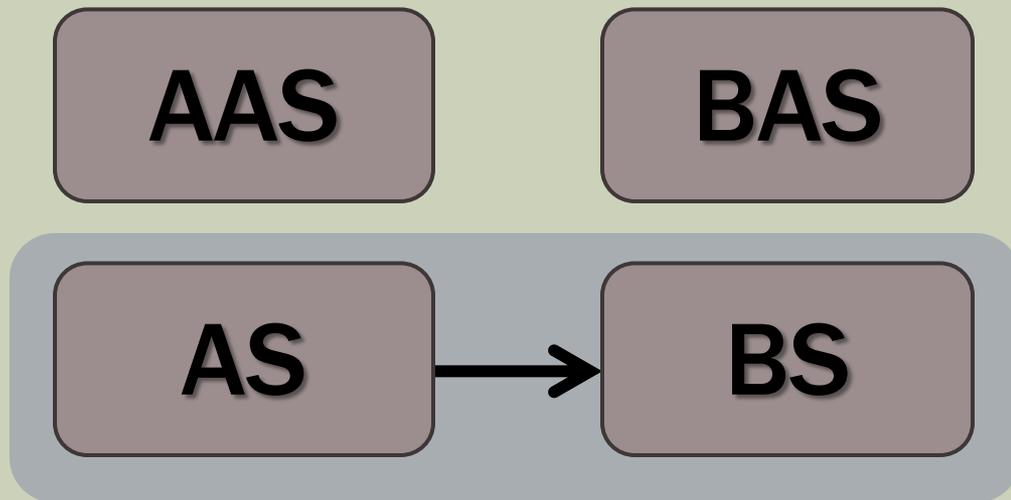
AAS in Robotics Technology  
at Baltimore City  
Community College

transfers to

BS in Industrial Engineering  
at Morgan State University

# WHAT IS AN APPLIED BACCALAUREATE (AB) DEGREE?

- Variety reflected in practice



## Example

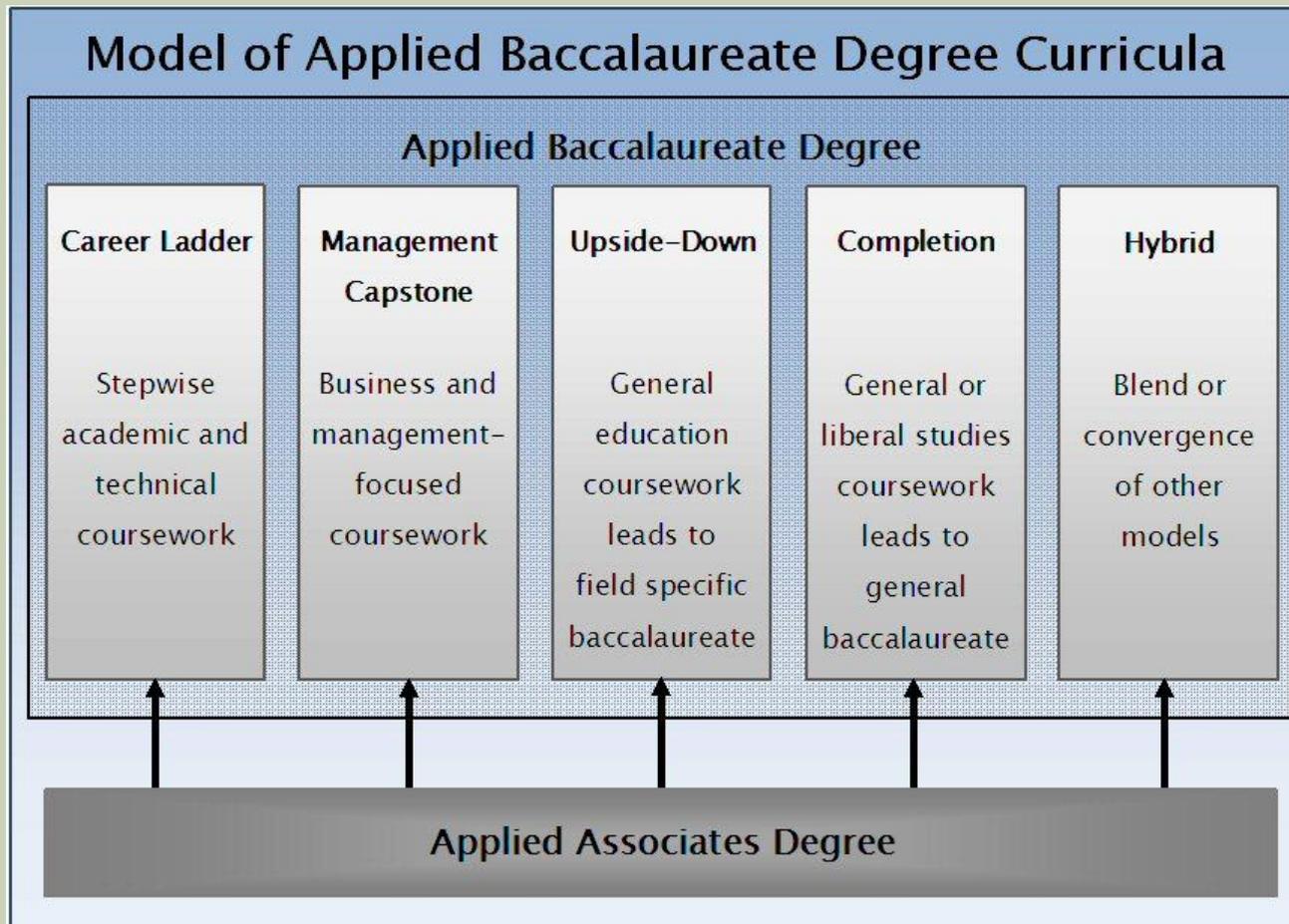
AS in Computer Networking  
at Oxnard College &  
AS in Computer Network Systems  
Engineering at Moorpark College

transfer to

BS in Information Technology  
at California State  
University-Channel Islands

# WHAT IS AN APPLIED BACCALAUREATE (AB) DEGREE?

- Many curricular models are found in practice



# WHAT IS AN APPLIED BACCALAUREATE (AB) DEGREE?

- **Our understanding of AB is constrained when we limit ourselves to a single definition based on credential titles, institutions awarding degrees, or state political environments**
- **This research draws upon central characteristics of AB degrees:**
  - applied learning, courses, and degrees
  - technical associate credits and degrees once considered “terminal,” now transferred for credit toward a baccalaureate degree
  - higher-order thinking skills and advanced technical knowledge and skills

# WHY STUDY AB DEGREES IN STEM?

- **National calls for raising college completion levels**
  - “We seek to help an additional five million Americans earn degrees and certificates in the next decade” (Obama, 2009).
  - The Lumina Foundation’s (2010) Big Goal is to raise the proportion of the American adult population that holds a college degree or credential from the current 37.9% to 60% by 2025.
- **Demand for expertise and training in STEM fields**
  - In 2008, 92% of STEM employees had some postsecondary education, with 71% having at least a bachelor’s degree. These educational attainment requirements are projected to remain steady through 2018 as STEM occupations continue to grow and expand (Carnevale et al., 2008).
- **Requires new ways of thinking**
  - The demands of the current market cannot be met by focusing solely traditional college-going student populations in traditional pathways.
  - Must consider more inclusive approaches, with a variety of degree pathways.

# ABOUT OUR RESEARCH: AB THROUGH THE LENS OF NSF-ATE

- **Identify NSF-ATE projects and centers across the U.S. that are affiliated with associate to baccalaureate degree pathways**
  - Survey of NSF-ATE Principal Investigators
  - Resulted in identification of 95 pathways
- **Explore curricula associated with identified pathways**
  - Search institutional websites of all identified pathways to examine curricular models and to compare similarities and differences among identified curricula
- **Gather detailed information on identified AB degree pathways**
  - Conduct follow-up surveys and in-depth website reviews to understand pathway structures and communication strategies

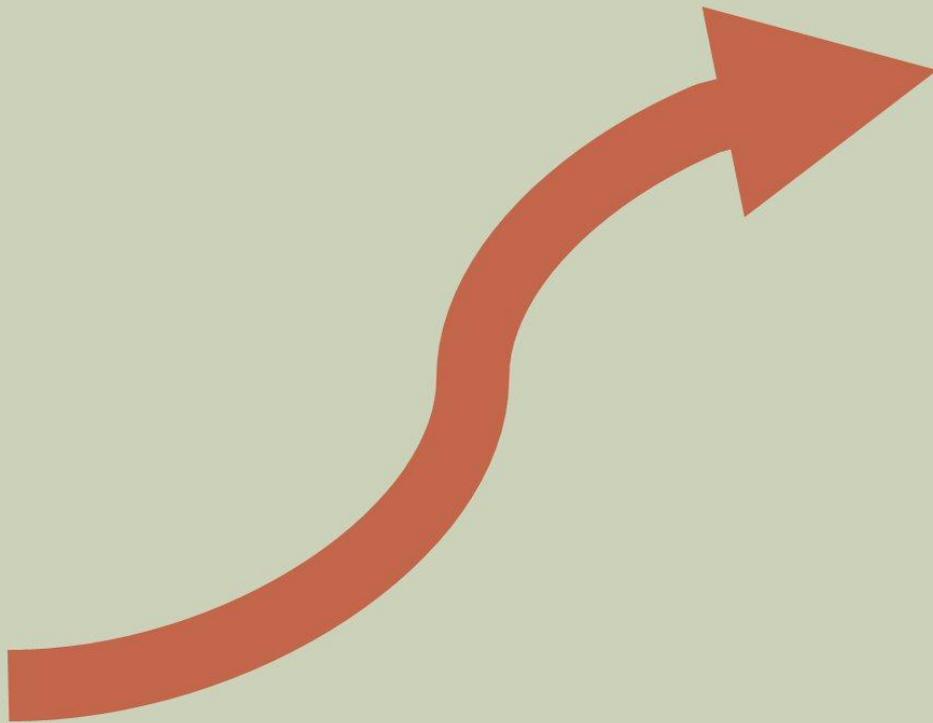
# NEW BACCALAUREATE DEGREE PATHWAYS EMERGING IN STEM TECHNICIAN EDUCATION

- Based on responses from 231 NSF-ATE projects and centers:
  - Identified 95 cases (41% of total) which had affiliated associate degrees with established pathways to baccalaureate degrees
  - Nearly 10% of all identified cases were in some stage of development, based on data gathered from institutional websites
  - Of the 51 cases for which we found evidence of the degree pathways in our website search, 69% were confirmed as AB degrees
  - Of the 10 AB degree pathways nominated as “notable” by respondents...
    - 2 were in development, scheduled to enroll the first class of students in Fall 2012
    - an additional 5 had been developed in the past 10 years

# EXISTING DEGREE PATHWAYS ADAPT IN RESPONSE TO THEIR ENVIRONMENTS

- **Several cases provided stories of a adapting their AB degree pathways in response to perceived influences from the environments in which they operate.**
  - **Creating a transfer associate degree curriculum by adapting a non-transferrable applied associate degree**
  - **Changing a historically non-transferable applied associate degree into a transfer associate degrees**
  - **Moving a baccalaureate degree program from a public university to a public community college, creating a community college baccalaureate (CCB) degree**
  - **Reshaping baccalaureate degree curricula descriptions and maps to highlight a native student population, rather than a transfer student population**

# QUESTIONS ABOUT EMERGENCE AND ADAPTATION



- What perceived needs are emerging degree pathways in STEM technician education established to meet?
- What program characteristics encourage flexibility and sustainability?
- How are adaptations viewed and understood by key stakeholders?

# **DIMENSIONS OF UNCERTAINTY RELATED TO AB DEGREE PATHWAYS**

- **Variety in program structures, designs, and terms used to describe programs**
- **Transferable and non-transferable associate degree programs exhibiting strikingly similar characteristics**
- **Evidence of outcomes and success often limited to anecdotal accounts**
- **Missed opportunities to communicate about degree pathways on departmental and degree program websites**

# AB DEGREE PATHWAYS DOMINATED BY VARIETY

- As supported by past research, efforts to establish these degree pathways appears quite localized, leading to an array of program structures, designs, and terms used to describe programs.

**At times, it appeared that variety was the strongest constant.**

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## Baccalaureate Degree-Granting Institutions

20% of the 95 identified degree pathways included community college baccalaureate (CCB) degrees.

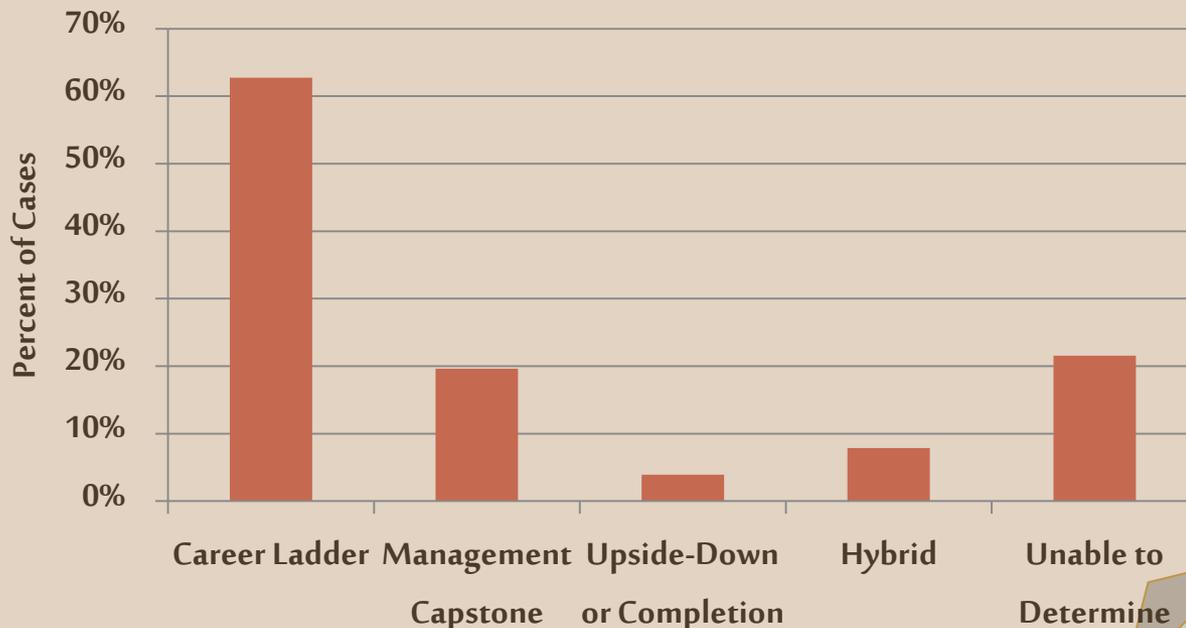
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Curricular Models (n = 51)



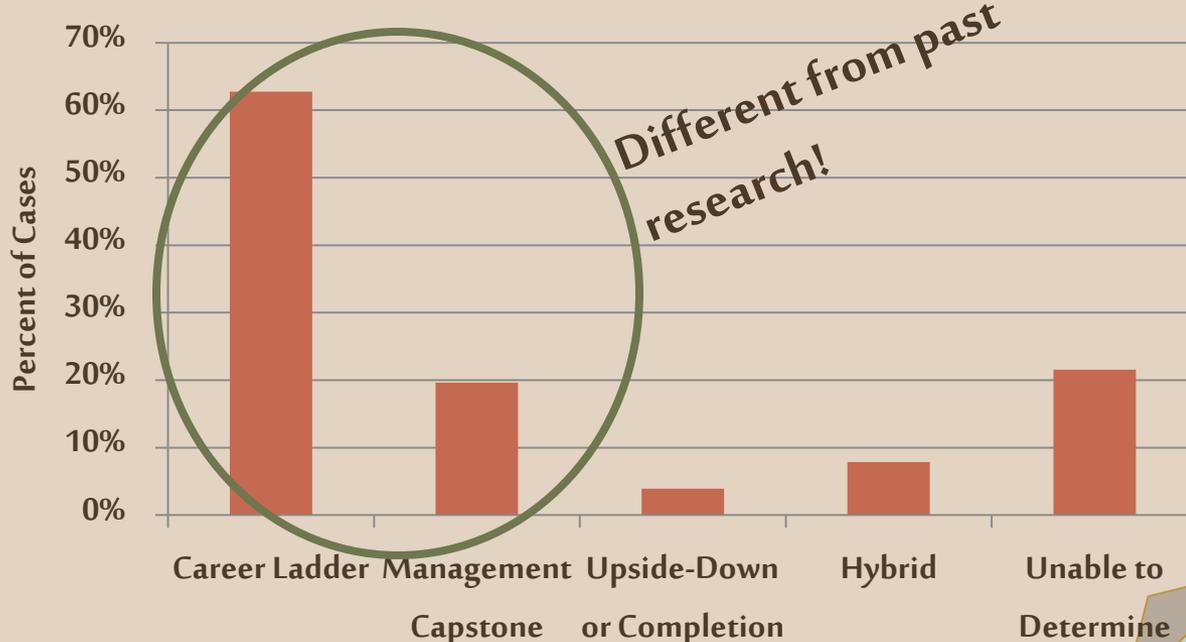
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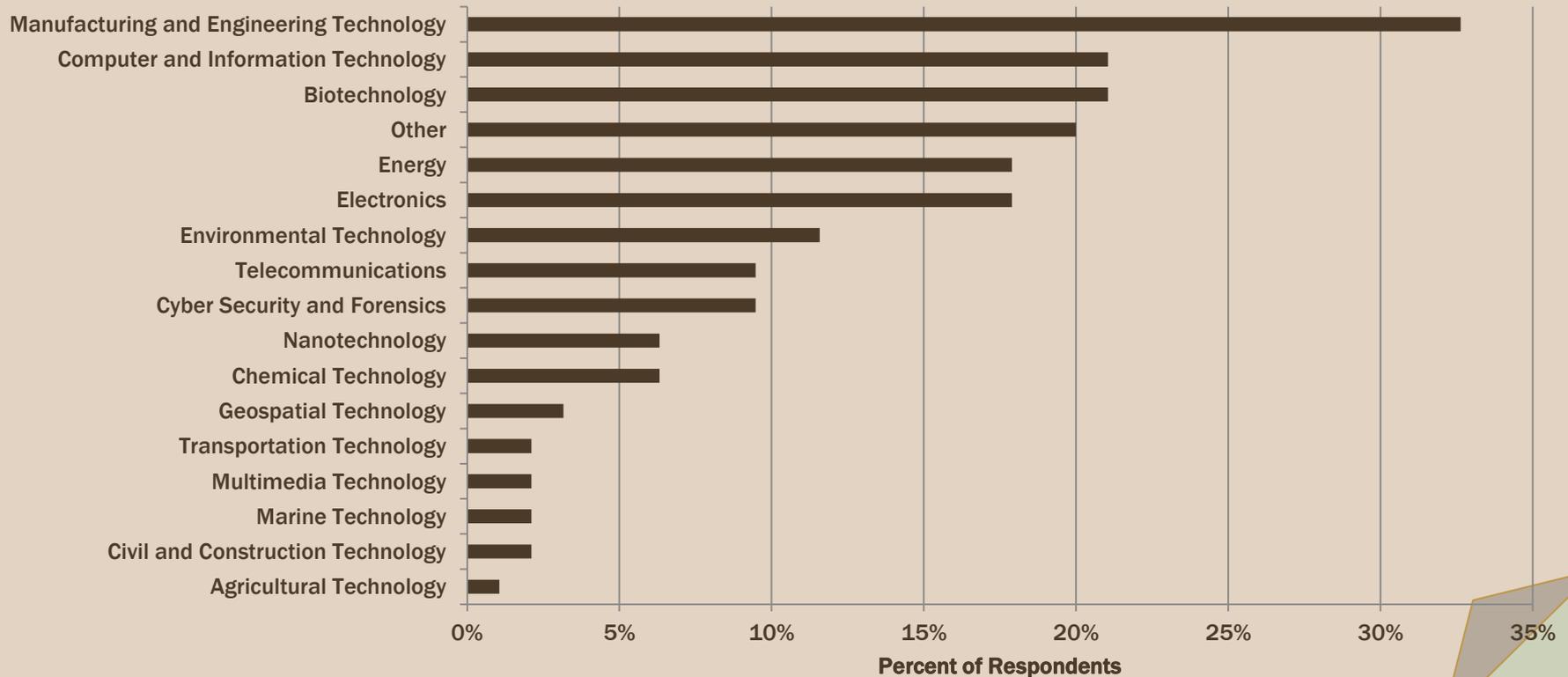
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# AB DEGREE PATHWAYS DOMINATED BY VARIETY

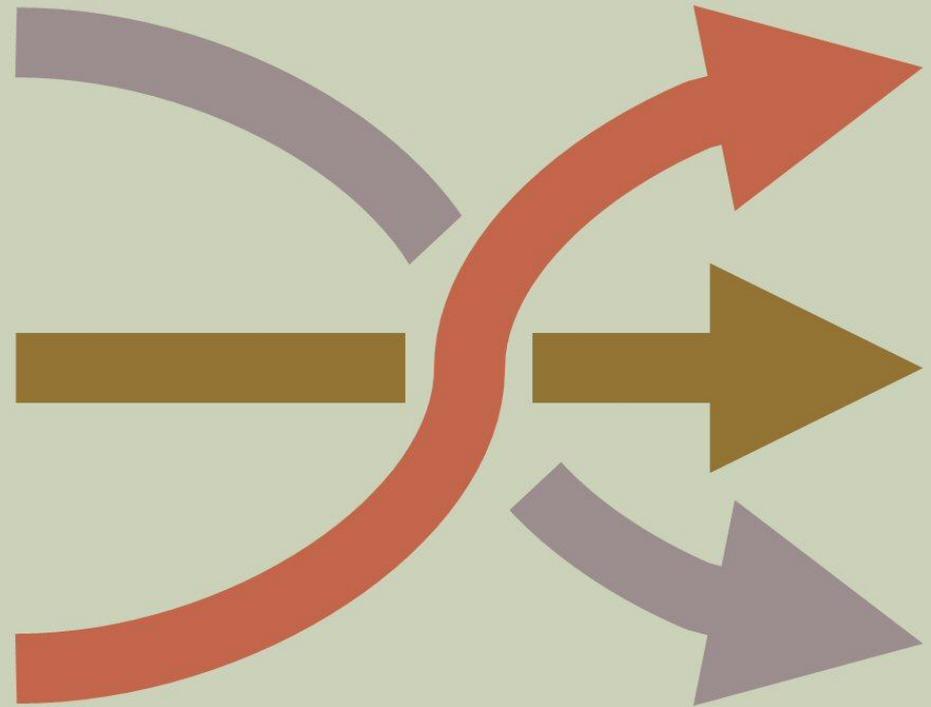
## Fields of Study

More than 30 fields of study were reported for the 95 identified traditional and AB degree pathways.



# QUESTIONS ABOUT VARIETY

- What does so much variety mean for the replicability of degree pathways?
- What can be learned from one baccalaureate degree pathway or program to be adapted or adopted to another setting?
- How do key stakeholders understand baccalaureate degree programs, particularly those that fall into categories of applied baccalaureate degrees?



# TRANSFERABLE VS. NON-TRANSFERABLE CURRICULA

- Examined 8 cases in which a transferrable (AS, AAS-transfer) and non-transferrable (AAS, ATA) associate degrees were available in a single field at a single institution
- What were the differences?
  - 4 cases      Minimal difference  
1 or 2 classes (5 - 11% of the curriculum)
  - 1 case        Moderate difference  
4 or 5 classes (~20% of the curriculum)
  - 3 cases        Substantial difference  
30 - 60% of the curriculum

# TRANSFERABLE VS. NON-TRANSFERABLE CURRICULA

Institution	State	Field	Difference
Brevard Community College	FL	Engineering Technology	Transfer: AS – College Algebra Nontransfer: AAS – Intermediate Algebra *
Hillsborough Community College	FL	Engineering Technology	Transfer: AS – Mathematics General Education Nontransfer: AAS – Mathematics with Applications *
Lake-Sumter Community College	FL	Computer Information Technology	Transfer: AS – Composition: Literature Nontransfer: AAS – 3 hours of professional electives with computer literacy & technical writing *
Northeast Wisconsin Technical College	WI	Electrical Engineering Technology	Transfer: Associate, Transfer – Calculus I & II Nontransfer: Associate, General – 6 credit hours electives, 2 credit hours technical courses
Edmonds Community College	WA	Energy Management	Difference between AAS-Transfer and ATA * lies in general education classes, with more choice offered to ATA students (e.g., ASA-Transfer students take English Composition I, while ATA students may take this class or Intro to College Writing or Business Communications)

\* Degree program developed first

# TRANSFERABLE VS. NON-TRANSFERABLE CURRICULA

- For institutions with substantial requirement differences between AS (transferable) and AAS (nontransferable) degrees, differences were found across the curricula:
  - General education / liberal arts
  - Writing
  - Mathematics
  - Science

**Program administrator statements reflected different underlying purposes to the degrees**

“The difference in the courses is that the AAS does not include all of the general education requirements for transfer. For example, there are no history, art, or music classes offered to these students. The only general education classes that are required for the AAS degree are those that are deemed necessary for the field that students are entering – namely an accounting class, a psychology class, two economics classes, and a business and technical writing class (which takes the place of the general education English requirement).”

# QUESTIONS ABOUT CURRICULA

- Are students in terminal versus transfer associate degree programs differentially prepared for future careers and educational opportunities?
- If preparation does, in fact, lead to similar outcomes, why is one associate degree pathway terminal while the other is fully transferrable?
- What value exists for maintaining separate tracks versus merging all pathways into transferable curricula?
- How do students perceive the similarities and differences between terminal and transfer degree programs?
- From an equity standpoint, which students pursue terminal associate degree tracks when similar, transferrable degree programs exist at the same institution?
- Who is best served by these curricular decisions?

# LIMITED EVIDENCE OF OUTCOMES

- **Many respondents pointed to success stories of individual students to highlight outcomes**

## **Example: Becoming Successful Students**

“It is hard to get students to commit to a degree program when they aren’t sure if they can do it, or if it is what they want. A lot of requirements can frighten people off.

I used to teach a gaming course, which was great for disconnected students. It spanned fall and spring semesters. I would talk with the students about study skills, goal setting. Over time, I could see the camaraderie growing in the class – they had a connection; they were all gamers. They also matured over that year-long class. When I run into them on campus now, I can see that they are becoming more successful students. They just needed that extra year to mature.”

*~ Faculty member at Moorpark College,  
AS program in Computer Network Systems  
Engineering*

# LIMITED EVIDENCE OF OUTCOMES

- Many respondents pointed to success stories of individual students to highlight outcomes
- Across the 95 baccalaureate degree pathway cases, clear knowledge gaps exist regarding the availability of student-level outcomes data at the baccalaureate level

## Survey Data

Are student-level data available for any of the baccalaureate degree pathways affiliated with your NSF-ATE project or center?

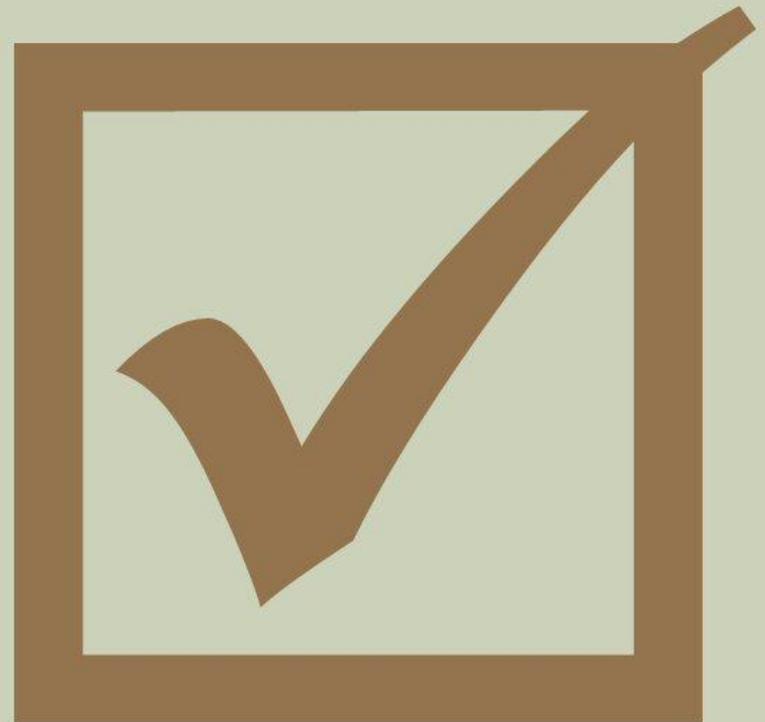
Data Type	Yes	No	Don't Know	No Response
Demographics	26%	14%	52%	8%
Academic Performance	21%	15%	55%	9%
Post-Graduation Outcomes	14%	16%	62%	8%

# LIMITED EVIDENCE OF OUTCOMES

- **Many respondents pointed to success stories of individual students to highlight outcomes**
- **Across the 95 baccalaureate degree pathway cases, clear knowledge gaps exist regarding the availability of student-level outcomes data at the baccalaureate level**
- **Several reasons were cited regarding the inability to track student progress**
  - Small number of faculty (often 1 or 2) who manage programs
  - Lack of time and staff support to pursue evaluation or tracking
  - Lack of reporting systems that cross institutional boundaries

# QUESTIONS ABOUT OUTCOMES

- What evidence is available to demonstrate outcomes of AB degree pathways?
- How are student, institutional, employer, and economic impact outcomes measured?
- What drives data collection, and with whom are the results of data analyses shared?
- What data is shared across institutions? What supports the sharing of data, and what additional resources are needed to facilitate communication?



# MISSED OPPORTUNITIES ON WEBSITES

- **In many cases, information about baccalaureate degree pathways was not readily available on departmental or degree program web pages**

## Examples from the Data

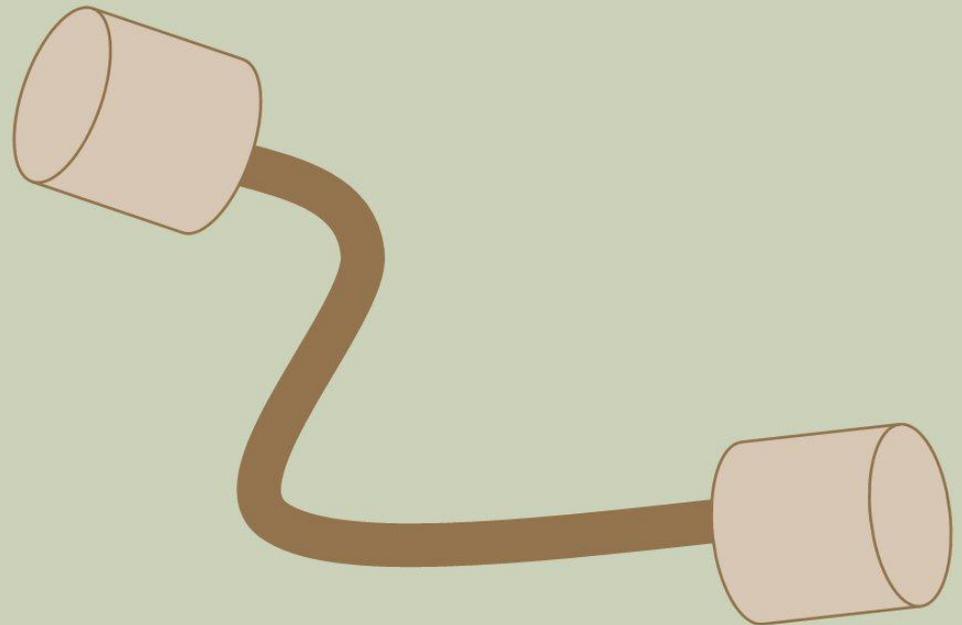
In 23 of 77 cases analyzed with website searches (30%), we were unable to locate information about the existence of pathways that were reported on surveys.

Among cases that respondents identified as “notable” :

- 36% of associate institutions mentioned the transfer relationship with a specific baccalaureate institution
- 25% of baccalaureate institutions mentioned the transfer relationship with a specific associate institution

# QUESTIONS ABOUT COMMUNICATION

- How is information shared with prospective and current students; employers; higher education administrators, faculty, and program directors; and policy makers?
- What avenues for communication are optimal?
- How are AB degree pathways perceived by key stakeholders? What contributes to those perceptions?



# FOR MORE INFORMATION

- View our recent AB technical report

*Investigating Applied  
Baccalaureate  
Degree Pathways in  
Technician  
Education*

Available at:

[http://occrillinois.edu/  
projects/  
nsf\\_applied\\_baccalaureate](http://occrillinois.edu/projects/nsf_applied_baccalaureate)



**Investigating  
Applied Baccalaureate  
Degree Pathways in  
Technician Education**

*Technical Report*

Julia Panke Makela  
Collin M. Ruud  
Stacy Bennett  
Debra D. Bragg

Office of Community College  
Research and Leadership,  
University of Illinois at Urbana-Champaign

March 2012

# REACTION AND RESPONSE

## ■ Institutional evolution/innovation

- Theme 1: Baccalaureate degree pathways are dominated by variety.
- Theme 2: Current definitions of AB degree pathways and programs were insufficient to describe identified cases.
- Theme 3: New baccalaureate degree pathways are emerging in STEM education, and AB degree pathways have a strong presence.
- Theme 5: AB degree pathways adapt in response to their environments.

## ■ Validating Options

- Theme 4: Applied and traditional associate degree programs can exhibit strikingly similar characteristics.
- Theme 7: Departmental and degree program websites miss opportunities to communicate baccalaureate degree pathways to key stakeholders.
- Theme 8: Some respondents avoid applied language due to perceived stigma.

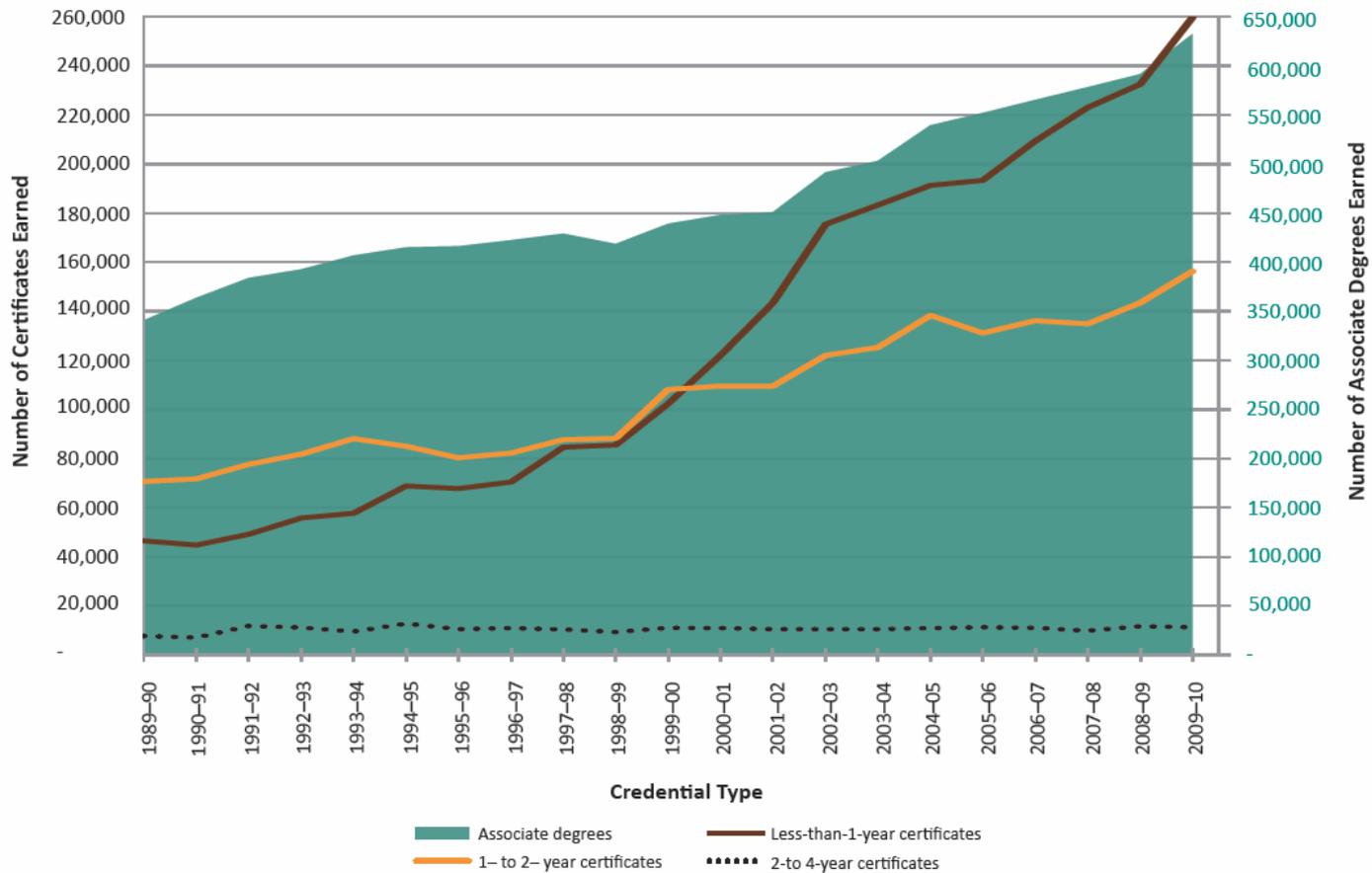
## ■ Breaking Down Data Silos

- Theme 6: Despite recent program developments, limited evidence exists about the outcomes and impacts of baccalaureate degree programs and pathways.

# SO WHAT?

**Figure 1**

**Number of Associate Degrees and Certificates Earned at Community Colleges: 1989–1990 to 2009–2010**

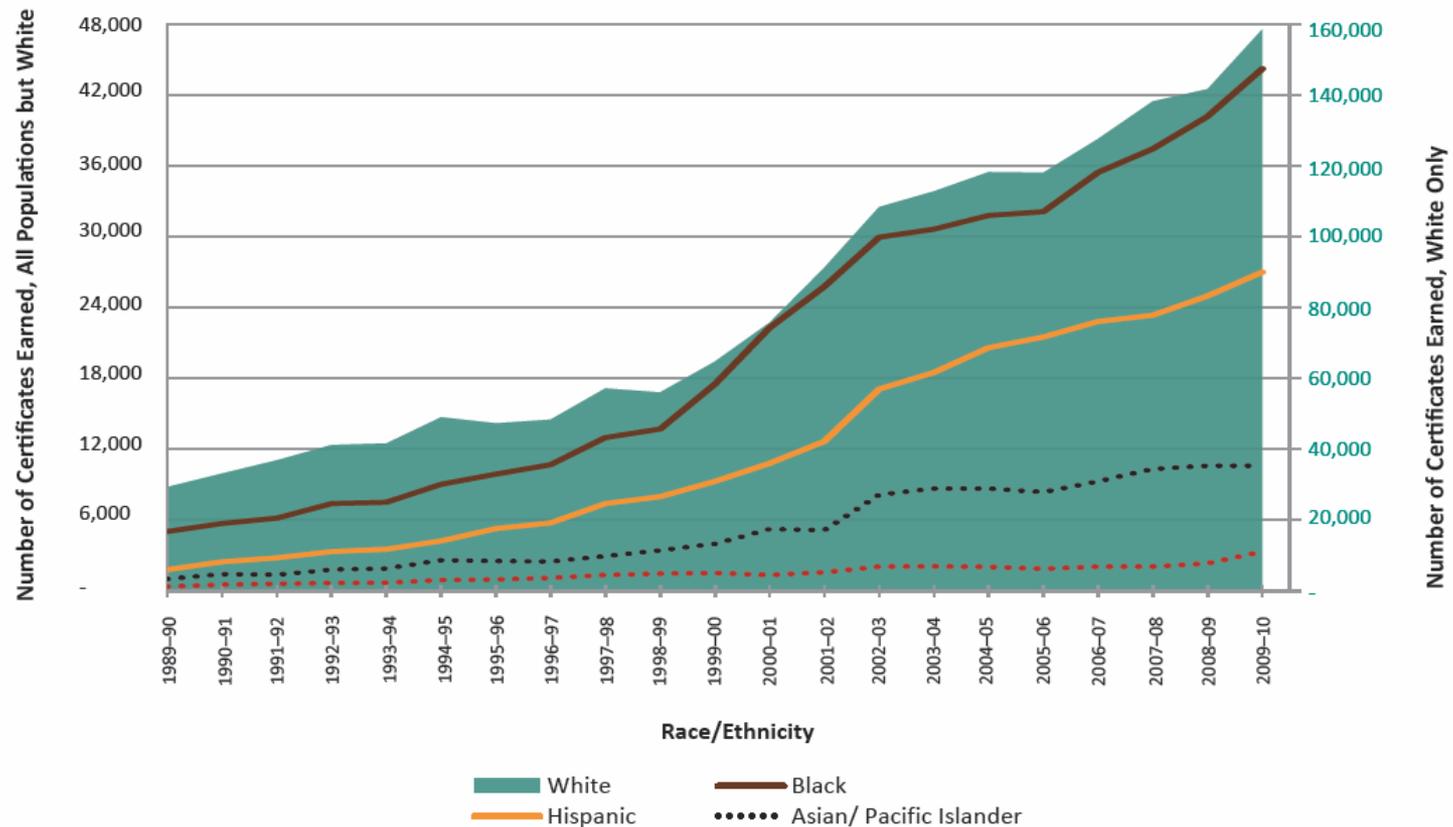


*Note.* Data from 1999–2000 to 2009–2010 include public community colleges that offer the bachelor’s degree. Prior years include only public, 2-year institutions. Bachelor’s degrees are not included in the graph because they are a relatively new opportunity provided by community colleges.

# SO WHAT?

**Figure A1**

**Number of Less-Than-1-Year Certificates Earned at Community Colleges, by Race/Ethnicity: 1989–1990 to 2009–2010**



Source: NCES (2011c).

Note. Data from 1999–2000 to 2009–2010 include public community colleges that offer the bachelor’s degree. Prior years include only public, 2-year institutions. Excludes categories of Nonresident alien, Unknown, and More than two races that contribute to totals presented in text.

# TAKING YOUR QUESTIONS



Julia Panke Makela



Collin Ruud



Christopher Mullin

# THANK YOU FOR JOINING US! FOR MORE INFORMATION...

## ■ View our recent AB publications

- Investigating Applied Baccalaureate Degree Pathways in Technician Education (*Executive Summary & Technical Report*)
- Exploring the Landscape: Identifying pathways to baccalaureate degrees in technician education (*Research Brief*)

■ Contact Julia Panke Makela  
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(217) 244-2457

■ Visit our AB website at:  
[http://occrillinois.edu/applied\\_baccalaureate](http://occrillinois.edu/applied_baccalaureate)

