OUTCOMES EVALUATION OF APPLIED BACCALAUREATE DEGREE PROGRAMS IN STEM AND TECHNICIAN EDUCATION

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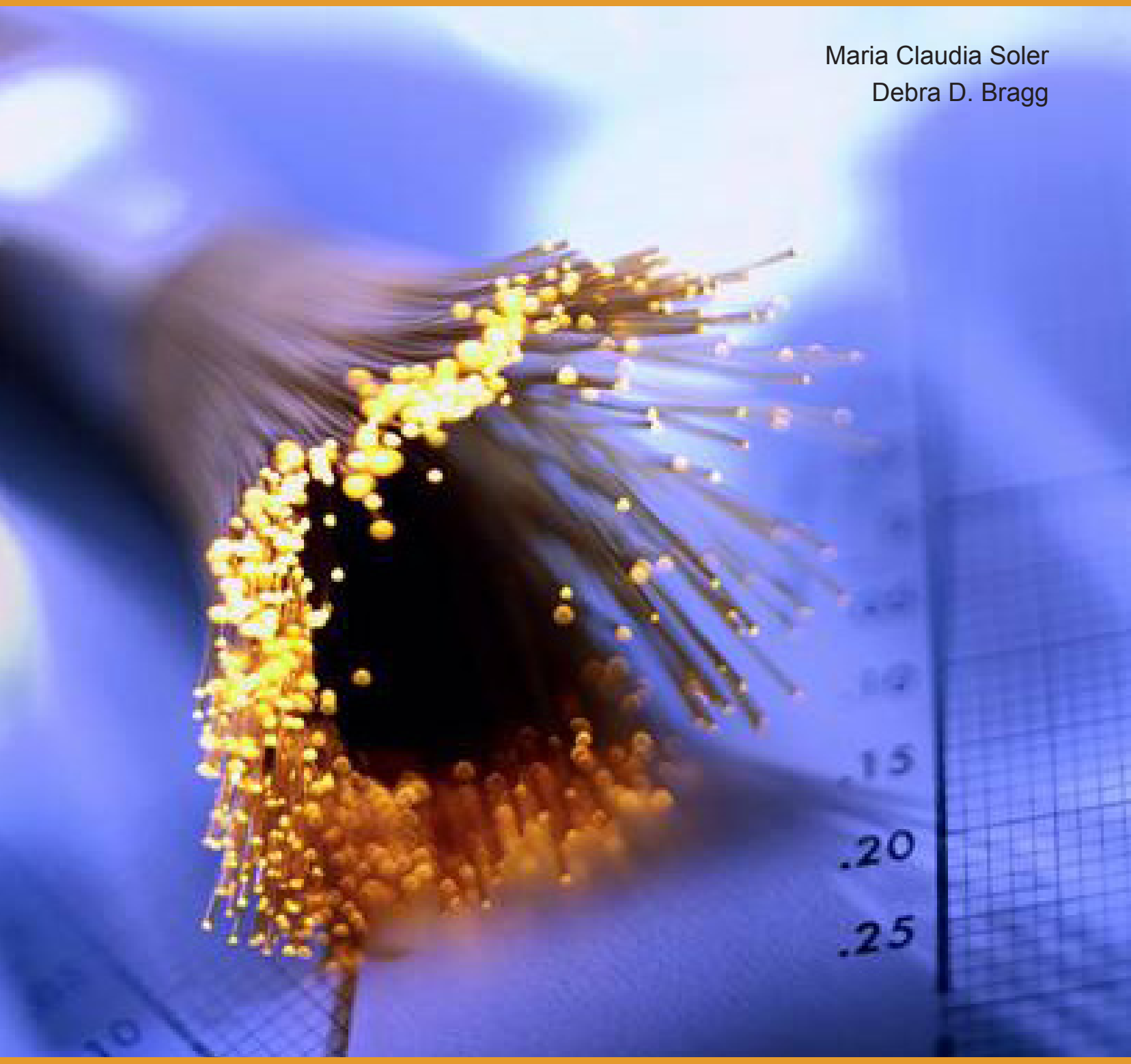

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We want to thank the colleges and universities that opened their doors to our research team to enable us to better understand the implementation and potential impact of Applied Baccalaureate (AB) degree programs. We are also grateful to our funder, the National Science Foundation (NSF), Advanced Technological Education (ATE) program. We also express our gratitude to Mark Combs, Carol Chen, Erica Harwell, and Collin Ruud who served as members of our AB research team at various points during the 5-year project. We are proud that our collective work has informed the nation's evolving conversation on AB degrees.

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Abstract

To address a gap in research and practice, we focus this paper on the need for high quality evaluation of AB degree programs. We define outcomes evaluation, and we discuss why this type of evaluation is important to understanding the implementation and impact of AB degrees. We also provide practical examples of ways to evaluate AB degree programs, including offering instruments that our research group used to study the implementation AB degrees offered by traditional associate- and baccalaureate-degree institutions. We contend that high quality evaluations should be grounded in questions that reveal how AB degree programs benefit students, institutions, communities, and states, and they should be carried out using evaluation designs that inform program implementers, students, employers, policy-makers, and others who seek to know how these programs are implemented, how diverse students are impacted, and how the workforce is improved. In doing this work, it is important for evaluators to demonstrate that they are fair and unbiased toward AB degree programs and open to whatever results emerge, whether they favor AB degrees or not.

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Introduction

Though far from commonplace, STEM and technician education programs that award Applied Baccalaureate (AB) degrees are on the rise in the United States (Makela, Ruud, Bennet, & Bragg, 2012) (see Figure 1). Numerous factors contribute to their proliferation, including the desire to improve associate-to-baccalaureate degree transfer policies and processes, the need to increase college completion rates, the need to offer workforce-relevant instruction for working learners who are retraining or advancing in their chosen career paths, and the need to better align higher education with the changing labor market post the Great Recession. Due, in part, to their relative newness to traditional forms of the baccalaureate degree (e.g. Bachelor's of Arts and Bachelor's of Science), but also to the unconventional focus on applied learning at the baccalaureate level, AB degrees are controversial and also complex to implement. Paradoxically, practitioners who implement AB programs sometimes face charges of promoting a form of college education that is too narrowly crafted to employer agendas and at the same time, too similar to traditional baccalaureate degrees to engender mission creep and wasteful spending of public resources. Due to the lack of research on AB degrees, these questions are nearly impossible to answer at the present time, therefore evaluation of AB degree programs is critically important.

Representing important charges at any time, and especially times of fiscal austerity, evaluation of AB degree programs is needed. One way to address this need is to evaluate AB degrees to use quantitative and qualitative methods that enable deeper and more nuanced understanding of program outcomes. Attributing outcomes to particular stakeholder groups, including students, is very important. Similarly, conducting evaluation that involves other stakeholders, such as community college personnel, university personnel, employers, policy makers, and others, is important. Also, since AB degree programs tend to be local and regional, and also almost always situated within the state context, understanding how AB degrees operate in a particular geographic locale, such as community, state, or region, is vitally important.

For some time, the field of study associated with program evaluation has been shifting its focus from inputs to outcomes, which has contributed to a broader agenda of evidence-based evaluation relative to policy making (Gertler, Martinez, Premand, Rawlings, & Vermeersch, 2011). This agenda is impacting all of higher education, with postsecondary institutions being encouraged to look at a broader set of outcomes.

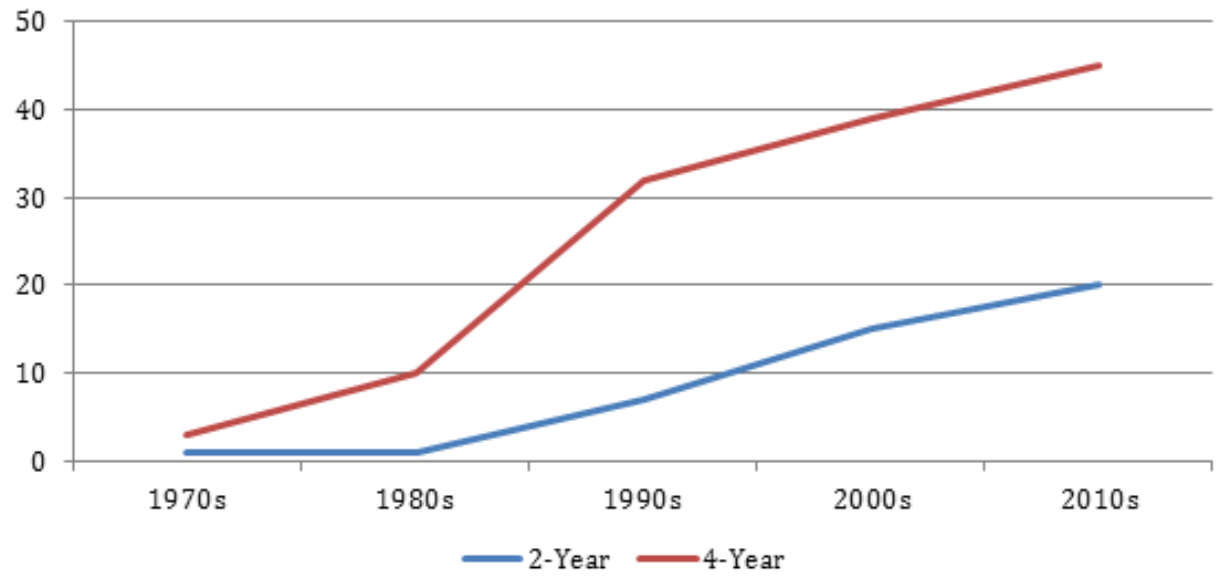

Figure 1. Growth in state AB degree conferral by one or more higher education institutions in the 50 states, by 2-year or 4-year institution level.

Postsecondary institutions are also encouraged to scrutinize the means by which these outcomes can measured, including considering alternatives to outcomes that have been evaluated historically (for additional context, please see Bragg, 1992). Considering the emergence of AB degrees across the United States, evaluation of the outcomes of AB degrees is important. This is because AB degrees call for measures of both education attainment and employment outcomes in order to determine program effectiveness. Focused on enhancing students' transfer to the baccalaureate and employment opportunities, AB degrees require measures of transfer and baccalaureate degree attainment, as well as employment (e.g., job attainment and retention, career progression, and wages and benefits).

The need to evaluate AB degree programs is also important simply because these types of programs are expanding throughout the United States. Most recently the state of California passed state legislation ((SB 850) to pilot AB degree programs in 15 community colleges, representing our most recent known expansion of AB degrees in the United States. Elsewhere in the U.S., these degrees have existed for quite a long time, at both the associate- and baccalaureate-degree granting institution levels (see again Figure 1). As of 2009, AB degrees were offered in at least one public 4-year institution in 39 states (Townsend, Bragg, & Ruud, 2009). In the nation's changing economy, there is increasing demand for baccalaureate level education for jobs that have never before required that level of education. One potential solution to issues related to baccalaureate attainment and workforce development is the applied baccalaureate degree.

Applied baccalaureate degrees have arisen from a number of convergent forces to provide a bachelor's degree option for participants in Associate of Applied Science (AAS) degrees. By 2010, 18 states had at least one public institution, typically a community college, that granted associate degrees as well as AB degrees (American Association of State Colleges and Universities, 2010). In states where state legislation on the AB degree exists, practitioners and scholars have dealt with program implementation for some time. Making AB degrees possible through processes such as course development, program admissions, funding and financial aid, academic advising, and the hiring of faculty and staff has been given attention, but the evaluation of AB degree programs has been extremely limited (Soler & Bragg, 2015).

An outcomes evaluation asks what the program is expecting to achieve and uses answers to these questions to assess whether the program is meeting its goals. Apart from shaping understanding of how AB degrees operate on the local level, answers to these questions can influence AB policy and program implementation on the state level.

Growing interest on AB degrees has led some institutions and states to study the conditions under which AB degrees are implemented as a precursor to understanding the impact of these degrees on students and programs. Yet, there is no agreement about evaluation designs and methods that are best suited to evaluate the outcomes of AB degrees, nor is there consensus about what outcomes evaluation should measure. This paper aims to fill this gap by informing practitioners and scholars on options for evaluating the outcomes of AB degrees, including articulating levels of analysis that the evaluation should address. These levels include, but are not limited, to students, institutions, employers, and society writ large. Our idea behind specifying certain AB outcomes as well as various methods to do so is intended to reveal, as Lincoln (1998) points out, "evaluation information on which people would actually be willing to act" (p. 102) (Ryan, 1998).

This paper offers insights into the evaluation of AB degrees in the following areas:

- Definitions of outcomes evaluations and explanations of ways to conceptualize outcomes and impact evaluation of AB degrees.
- Descriptions of levels of outcomes that merit consideration when evaluating AB degrees.
- Methodological issues associated with evaluation designs, selection and development of instrumentation, sampling, and other considerations, including examples of instrumentation that we have used in our research on AB degrees.
- Final recommendations to evaluate AB degrees.

The Meaning of Outcomes Evaluation, and Why it is Important

Several terms are used in association with evaluation of AB degrees, including assessing, tracking, and monitoring, so we want to start by explaining what we mean by evaluation of the outcomes and impact of AB degrees. Many questions can be used to frame this type of evaluation, but two general questions help to focus our discussion. They are: 1) What difference has your AB degree program made?, and 2) How are the lives of AB participants changed as a result of their participation in AB degree programs (Voelker-Morris, 2004). Both questions focus inquiry on quantifiably or qualitatively measurable expressions of results that can accrue from an educational program (Bragg & Harmon, 1992). From this perspective, outcomes evaluation may also seek to answer questions that policy makers pose about accountability, performance, and cost-benefit (Greene, 1997). Schalock (2001, p. 6) separates each of these aspects of evaluation when describing outcomes evaluation as an approach that:

> [U]ses person- and organization-referenced outcomes to determine current and desired person- and program-references outcomes and their use (program evaluation), the extent to which a program meets its goals and objectives (effectiveness evaluation), whether a program made a difference compared to either no program or an alternative program (impact evaluation), or the equity, efficiency or effectiveness of policy outcomes (policy evaluation).

Our perspective of AB outcomes evaluation aligns closely with these ideas. We understand AB degrees as bachelor's degrees designed to incorporate applied associate courses and degrees once considered as 'terminal' or non-baccalaureate level while providing students with higher-order thinking skills and advanced technical knowledge and skills so desired in today's job market (Townsend, Bragg, & Ruud, 2009). In correspondence with that definition, we frame our understanding of outcomes evaluation of AB degrees as the process of examination of the outcomes that these baccalaureate degree programs may have on students, institutions, and employment.

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Evaluation of the outcomes of this particular type of baccalaureate entails some elements of evaluation mentioned by both Greene (1997) and Schalock (2001). As an example, considerations of accountability and effectiveness often stem from external pressures to better understand the impact of AB degrees. However, we do not advocate for a particular methodology to evaluate the impact of AB degrees; nor do we drill deeply into each of the types of evaluation components described by Schalock (2001). Rather, we draw upon literature associated with various elements of evaluation models used in education and other social sciences to consider their implication for evaluating the impact of AB degrees. We also pay special attention to outcomes evaluation methodologies especially relevant to AB degrees.

Internal and external forces pressure higher education to demonstrate accountability (Bragg & Harmon, 1992), including linking funding to measurable outcomes and using evidence to sustain program changes (Krueger, 2015). Likewise, evaluations can help to identify institutional accomplishments and to inform stakeholders about those accomplishments (Krueger, 2015). In the case of AB degrees, state legislation authorizing these degrees may include requirements of institutions to evaluate the outcomes of these degrees at various levels. Other stakeholders are interested

in understanding the extent to which AB degrees accomplish their intended goals to help them make decisions about new AB degree implementation (which directly affects educators and students) and to make decisions about placing graduates in work-based learning opportunities and employment (which directly affects employers and the economy). With respect to internal and external pressures, it is important to specify the stakeholders who could benefit from results pertaining to AB degrees. According to Greene (2007), the purpose of evaluations can be grouped into four primary clusters that have relevance to the evaluation of AB degrees.

Inform Decision-makers

First, a primary purpose of evaluation is to inform decision-makers or to provide accountability information, which tends to serve the needs and interests of policy and other decision makers (Greene, 2007). For instance, to enhance policy decisions such as whether or not to continue or expand AB degrees at both the institutional and state level, the evaluation of AB policy should aim to answer questions such as: Are AB degrees effective relative to the absence of these degrees? And, when AB degrees are implemented in several ways, which approach is the most effective? Equally important, evaluations that examine the effectiveness of AB degrees provide useful information for future investment decisions. Imas and Ray (2009) call this type of evaluation an "efficiency audit" (p. 275) as it focuses on identifying opportunities to reduce budgetary cost of delivering potentially duplicative program outputs. In other words, decision-makers are able to determine priorities in relation to costs and consequences and to determine strategy-planning priorities (EuropeAid Co-Operation Office, 2005). Evaluations that include cost-effectiveness analysis enable comparison of resource allocation strategies (EuropeAid Co-Operation Office, 2005), which also helps reassure funders, including donors and taxpayers, that their tax dollars are being invested wisely.

For Purposes of Evaluation (Greene, 2007)

- Inform decision-makers
- Improve programs
- Provide stakeholder perspectives
- Evaluate equitable outcomes

Improve Programs

Second, a purpose of conducting evaluations of AB degrees is to improve the programs that are being evaluated and to enhance the institution in which the program is located, which typically constitutes a valuable source of information for managers and others responsible for day-to-day operations (Greene, 2007). Evaluating AB degrees can provide practitioners with a set of tools to verify and improve institutional performance at various stages of implementation, and even after implementation has been fully achieved. When the level of analysis of AB degrees is the institution, the evaluation focuses on assessing the capacity and the specific procedures that the institution carries out to meet the intended goals of the degree. Since processes and results are continuously evaluated at each stage of implementation to assist practitioners in making informed decisions associated with improving, replicating, sustaining, scaling up, or even discontinuing AB degrees in their institutions.

Provide Stakeholder Perspectives

Third, evaluations of AB degrees can also provide an in-depth and contextualized understanding of a program and its practices from the perspective of administrators, board members, and program participants, and other stakeholders (Greene, 2007). In our study of stakeholders' perspectives on AB degrees (see Soler & Bragg, 2015), we point out the ways different stakeholder groups perceive of AB degrees and how these perspectives impact AB adoption and implementation. This approach to research

of AB degrees created deeper understanding of these degrees in various postsecondary contexts while assisting researchers in the understanding of factors that influence AB policy adoption and implementation. As Soler and Bragg (2015) describe, perspectives on the AB degree held by students, community college practitioners, university practitioners, and employers provide potential insights into the ways these degrees aim to enhance associate-to baccalaureate degree transfer, to increase baccalaureate degree completion, to deliver instruction to non-traditional and underserved learners, and to align higher education with the workforce, all of which could be considered AB outcomes. In this sense, gathering data on stakeholders' perspectives can help to identify which outcomes to measure and to enrich the evaluation process at various stages of the process.

Evaluate Outcomes

Lastly, evaluations of AB degrees can be designed to evaluate whether outcomes are equitable, and whether they promote greater social justice in terms of contributing to the social and economic well-being of program participants, their families, and their communities (Greene, 2007). In this regard, outcomes and impact evaluations can help to identify gaps in outcome results between racial, ethnic, low income, and other groups and special populations (Taylor et al., 2012). Although this approach to evaluation is complimentary to the previously articulated reasons to conduct evaluation, it is different in that it focuses on equity indicators. Disaggregating student outcomes, for instance, is one strategy to identify how AB degrees are impacting different student groups.

Apart from the four purposes and benefits of outcomes evaluation previously articulated, there are other arguments for undertaking evaluation of AB degree programs. Using Westhorp (2014)[1], we offer three additional reasons for conducting outcomes evaluation that are grounded in the literature, including reference to AB degrees as a means of increasing baccalaureate attainment rates and the need to know whether these effects are helping states and the nation meet college completion targets. Furthermore, the extent to which AB degrees are helping employers meet new and emerging workforce needs deserves careful evaluation, especially since this rationale is some of the most pervasive in support of AB degrees. Further outcomes evaluation is needed to better understand whether AB degrees are having such impacts so that good decisions are made about expansion and scale-up.

Second, evaluation of the outcomes of AB degrees can provide valuable information to help practitioners with the process of adapting and adopting these degrees in new and emerging labor market contexts. This is as relevant in states that are considering AB degrees for the first time as in states where AB degrees are already in place. On-going conversations about the scaling of new baccalaureate degrees, including the AB degree, deserve scrutiny and careful evaluation in terms of what actually transpires.

Third, little is known about the effectiveness of AB degrees at the institutional and state level, and this is critical information for policy makers. Our research at the Office of Community College Research and Leadership (OCCRL) at the University of Illinois at Urbana-Champaign, with the support of the National Science Foundation-Advanced Technological Education (NSF-ATE) has examined the phenomenon of AB degrees in the U.S. Our project was designed to study program implementation, employer and partner engagement, workforce need and student interest, and other factors associated with NSF-ATE-funded Science, Technology, Engineering, and Mathematics (STEM) and technician education. The team has conducted research on AB outcomes in a number of NSF-ATE centers and projects, and we believe that some of our tools and templates may provide useful examples for future outcomes evaluation instrumentation. Using these and other pieces, further research on AB outcomes is warranted.

[1] Westhorp's (2014) approach to evaluation is called "realist evaluation", which is defined as a member of a family of theory-based evaluation approaches that begin by clarifying the mechanisms that are likely to operate, the contexts in which they might operate, and the outcomes that will be observed if they operate as expected.

Key Considerations in AB Outcomes Evaluation

Any evaluation of AB outcomes should begin with the formulation of inquiries that the evaluation seeks to answer with respect to certain outcomes. This document focuses on defining some key AB outcomes and formulating associated evaluation questions. As much as evaluation questions are central to the evaluation design, it is often helpful to construct a "theory of change" that describes how an intervention is supposed to deliver the desired results (Gertler et al., 2011). This *program theory* can provide evaluators of AB degrees with a rationale about the mechanisms through which these degrees achieve goals. The idea behind a theory of change is that the beliefs and assumptions underlying an intervention can be expressed in terms of a phased sequence of causes and effects (Weiss, 1997). In other words, theories of change explore the conditions and assumptions needed for the change to take place, make explicit the logic behind the program, and map the program interventions along logical causal pathways (Gertler et al., 2011). By doing so, evaluations can tell "not only how much change has occurred but also, if the sequence of steps appears as expected, how the change occurred" (p.p. 501-502).

The idea behind a theory of change is that the beliefs and assumptions underlying an intervention can be expressed in terms of a phased sequence of causes and effects (Weiss, 1997).

One way to model a theory of change in the study of AB degree outcomes is through a "results chain" (p. 24) (Gertler et al., 2011), which typically includes elements such as inputs, activities, outputs, outcomes, and final outcomes. An important contribution of this model is that it encourages evaluators to define measurable indicators for different outcomes. Since indicators are observable evidence of accomplishments, changes, or gains, they show how an outcome was achieved (Voelker-Morris, 2004). Institutions offering AB degrees can play a key role in defining these indicators because their knowledge of both the institution and the context places them in great position to define realistic and measurable indicators. Regarding this point, Gertler et al. (2011) use the acronym "SMART" to suggest certain conditions when defying outcome indicators. The acronym stands for indicators that are *specific* (that measure the information as precisely as possible), *measurable* (making sure that the information can be readily obtained); *attributable* (guaranteeing that each measure is related to the program's efforts); *realistic* (to ensure that the data can be obtained promptly, with reasonable frequency, and at a reasonable cost); and targeted (that refers to the specific population of study) (Gertler et al., 2011).

Given the variety of baccalaureate degree pathways, types of models, and curricular models, providing a high level of specificity is fundamental in the evaluation of AB degrees. In their study of AB degree pathways in technician education, Makela, Rudd, Bennet, & Bragg (2012) found that some baccalaureate pathways include historically transferable associate degrees (AA, AS), applied associate degrees (e.g., AAA, AAS), applied associate degrees (e.g., AAA, AAS), and AB degrees (e.g., Bachelor of Applied Science BAS, and the Bachelor of Applied Technology, BAT). Moreover, there are various types of degrees involved in specific baccalaureate degree pathways (e.g., applied associate to applied baccalaureate, applied associate to traditional baccalaureate, transfer associate to traditional baccalaureate), as well as various curricular models (i.e., career ladder, management capstone, upside-down, completion, hybrid)[2]. Although considering all the diversity of pathways,

[2] For a more detailed explanation on pathways, types of models, and curricular models please refer to the technical report. Makela, J. P., Ruud, C. M., Bennett, S., & Bragg, D. D. (2012). *Investigating applied baccalaureate degree pathways in technician education: Technical report.* Champaign, IL: Office of Community College Research and Leadership, University of Illinois at Urbana-Champaign. Retrieved from http://occrl.illinois.edu/files/Projects/nsf_ab/NSF-AB-TechReport-2012.pdf.

models, and curricular models adds complexity to the analysis of AB degrees, it also adds a great amount of detail and rigor to the evaluation process by helping to identify the particular features of an AB degree associated with a specific outcome.

Levels of Outcomes in Evaluating AB Degree Programs

AB policies and programs can have several outcomes and focusing one outcome or another mainly depends on the purpose of the evaluation. As mentioned earlier, some examples of outcomes associated with AB policy have to do with increasing baccalaureate completion, meeting workforce needs, delivering instruction to nontraditional and underserved learners, and expanding community college to economic development. These might not be the only outcomes of AB degrees, but because they are particular to students, institutions, and employers, the focal point of this section is to explore key outcomes and evaluation questions that pertain to each of these stakeholders.

NCES (1997) Taxonomy of Student Outcomes

- Academic outcomes
- Occupational outcomes
- Developmental outcomes
- Attainment outcomes

Student-level Outcomes

According to the U.S. Department of Education (USDE), National Center for Education Statistics (NCES) (1997), the term student outcome refers to those "education-related consequences of students´ postsecondary educational experience" (p. 4). When evaluating student outcomes, breaking up this definition is important to do. For instance, it is necessary to be precise and to define the population of study (the students whose outcomes we are interested in studying). Similarly, evaluators need to define the specific educational experience of interest: Is it a particular AB pathway or a particular AB degree?

Characterizing the student populations impacted by or enrolled in a particular degree program or institution is a good place to start an evaluation. For instance, the NCES examination of community college student outcomes in the U.S. between 1994 and 2009 focused on documenting baseline measures of, and trends within, associate-degree granting institutions (Horn & Skomsvold, 2011). Some of the trends included the distribution of first-time, beginning students´ educational goals when first enrolled on gender, race/ethnicity, age when first enrolled, and highest education attained by either parent. Additional variables included attendance status, degree or certificate program when first enrolled, remedial course-taking, employment status when first enrolled, income, financial aid, and transfer destination (Horn & Skomsvold, 2011). Characterizations of the student populations attending AB degrees can be presented using similar variables. When adapting the former definition of student outcomes we would need to refer to AB student outcomes as all the education-related consequences that enrolling, pursuing, and completing an AB degree brings for students. That includes characterizing the student populations that these degrees serve and the mechanisms through which these degrees meet or fail to meet their goals and expectations.

NCES (1997) elaborated a taxonomy of student outcomes that can be applied to AB degrees, including academic, occupational, developmental, and attainment outcomes. Academic outcomes include content learning, higher-order cognitive and intellectual development, communication and computational skills. Occupational outcomes include occupational preparation (e.g. occupational aspirations, occupational status, job placement, job satisfaction, promotability, occupational mobility, etc.) and workplace skills. Developmental outcomes involve psychosocial development (e.g. interpersonal skills, autonomy, motivation, etc.) attitudes, values, and beliefs,

as well as civic development, and attainment of student goals involves four indicators that are key for policy-making: educational success, success in transitions, economic impacts, and quality of life (NCES, 1997). The evaluation of AB degrees may include similar elements so that we can determine whether progress is being made towards achieving the expected student outcomes established for these degrees.

An important caveat of evaluating student outcomes is that there is wide variation in the ways through which certain outcomes are measured. In the case of completion, for instance, some scholars measure community college student success through intermediate indicators or milestones, such as the completion of course credits, the percentage of program completed, or whether a student passes the initial college-level course (Goldrick-Rab, 2010). These types of intermediate indicators are particularly useful for community colleges where large proportions of students do not persist for longer than a semester. Goldrick-Rab provides examples of how factors operating at each level affect rates of success at key times, including the initial transition to college, the experience of remedial education, and persistence through credit-bearing coursework. The article also discusses potential and ongoing reforms that could increase rates of community college success by addressing one or more areas of influence (the macro, the institutional, or the individual). Since restricting success to a select group (e.g., those who complete, without taking into account time of degree completion) can produce a falsely positive appearance of success, the creation of different baselines to measure student success for different types of students is necessary.

As mentioned earlier, the purpose of the evaluation determines the evaluation questions, which are also linked to the outcome(s) of attention. Consequently, there are several evaluation questions that can be investigated when designing an evaluation study of AB outcomes at the student level. Although these questions should be developed with as much specificity as possible, we offer examples of general evaluation questions that can guide the study of AB student outcomes:

- How long do students take to complete an AB degree?
- What are the patterns of credit attainment among AB students?
- What student characteristics (e.g., gender, race/ethnicity, socioeconomic status, parents´ education level, etc.) are associated with enrollment and completion of AB degrees?
- What evidence is there that AB degrees facilitate retention?
- For what type of AB students and in what circumstances did AB degrees facilitate baccalaureate degree completion?
- What enrollment characteristics (e.g., attendance status, completion of a degree or certificate program when first enrolled, remedial education participation, and employment status when first enrolled, among others) are associated with completion of AB degrees?
- What evidence is there that students learn higher-order thinking skills and advanced technological knowledge through AB degrees?
- To what extent do coursework patterns pertaining to AB degrees impact the acquisition of higher-order thinking skills and advanced technological knowledge?
- What evidence exists on the effects of different experiences of AB students in the same institution?
- What is the student's experience pursuing AB degrees?
- What is the employment rate of students who graduate with AB degrees?
- What are the career paths and job placement of AB graduates in your institution?
- Are there any earning gains associated with AB degree completion?

- What are the differences in student outcomes if they graduated from Bachelor of Applied Science (BAS), a Bachelor of Applied Technology (BAT), or a traditional baccalaureate degree (B.A. or B.S.)?

Our research on AB degrees has helped identify four categories that comprise some of the most important student-level AB outcomes: description of students in AB degree pathways, academic history of students who seek AB degrees, persistence and outcomes of students in AB degree pathways, and exploration of transfer pathways (for institutions with applied associate and applied bachelor's degree programs in similar academic fields, so that data can be collected for both the associate and bachelor's degree students). The following questions can guide the study of student-level outcomes for each category:

Four categories of evaluation of AB Degree Programs

- Students in AB degree pathways
- Academic pursuits of students who seek AB degrees
- Persistence of students in AB degree pathways
- Students in AB transfer pathways

Students in AB degree pathways. Important questions that pertain to the characteristics of students in AB degree pathways follow:

- What are the characteristics of students enrolled in AB degree pathways in terms of gender, race/ethnicity, age, socioeconomic status (SES), using receipt of Pell grants?
- How have the characteristics of students changed over the lifetime of the degree program?

Academic pursuits of students who seek AB degrees. Important questions that pertain to coursework follow:

- How many credits do the students earn prior to enrolling (or transferring) in to the bachelor's degree program?
- How many credits are accepted into the bachelor's degree program?
- What are students' transfer GPAs?
- What types of certificates and/or associate degrees do the students earn?
- How long (academic terms and years) do students take to complete those certificates and/or associate degrees?
- How much time elapses (academic terms and years) between completing the certificate and/or associate degrees and enrolling in the bachelor's degree program?

Persistence of students in AB degree pathways. Degree completion analysis includes groups: 1) students who complete the bachelor's degree; 2) students who do not complete the degree, but are enrolled in the final term of data collection; and 3) students who do not complete the degree, and are not enrolled in the final term of data collection. Comparison measures include the number of credit-hours attempted, number of credit-hours earned, cumulative GPA, number of academic terms enrolled, and number of years from first-term enrolled to last term enrolled.

Students in AB transfer pathways. This issue is particularly important for institutions with applied associate and applied bachelor's degree programs in similar academic fields, so that data can be collected for both the associate and bachelor's degree students.

- Which students complete the applied associate degree? Of those students, which students transfer to the applied bachelor's degree?

- How do these three groups of students (a) failed to complete the associate degree, (b) complete the associate degree and stop, and (c) complete the associate degree and transfer to the bachelor's degree compare, based on the following variables:
    - Demographics: gender, race/ethnicity, age, socioeconomic status
    - Academic history: remedial / developmental education, credits attempted in the associate degree program, credits earned toward the associate degree, number of academic terms enrolled in the associate degree program, number of years enrolled in the associate degree program, cumulative GPA in associate degree courses.

For those students who transfer to the bachelor's degree, repeat the persistence and outcomes analysis.

The use of instruments to collect student-level outcomes data is always part of the evaluation process. The methodological issues that emerge in measuring student outcomes associated with AB degree programs are discussed in more detail later in this document, and Appendix A presents a student-level data reporting template that may be helpful for evaluation purposes.

Exemplary studies. Although literature on AB outcomes is scarce, there are a few exemplary studies of AB program outcomes at the student level. For instance, Makela and Chen (2013) evaluated AB students´ outcomes at Lakeland Community College (LCC) in Ohio. In this follow-up evaluation, they examined the AAS degree in Biotechnology Science. The selected AB degree pathways articulate to bachelor´s degrees offered by three traditional baccalaureate-degree granting institutions: Case Western Reserve University (BA and BS in Biology), Cleveland State University (BS in Biology), and Ursuline College (BA in Biology and Biotechnology). The design involved the development of a survey to understand students' choices of associate and bachelor´s degree programs, their progress through applied associate and bachelor´s degree programs, and their expectations after graduation.

In total, 39 students (34 program graduates, 5 current students) completed the survey. An important contribution of this evaluation is the care with which the evaluators accounted for the type of AB degree pathway and the specific indicators associated with both the associate and bachelor´s degree. The report's method involved a survey design that included expectations of the AAS degree, reasons behind the selection of the institution, time to degree for different types of students (full-time, part-time, sometimes full-time-sometimes part-time), changes after receiving the AAS degree, employment outcomes, expectations to pursue the bachelor´s degree and type of bachelor´s degree selected (B.S., B.A., BAS, BAT, BT, other), relevance of associate degree courses for bachelor´s degree studies, time to degree for the bachelor´s degree, students´ experiences during the bachelor´s degree, and program resources.

Student outcomes associated with AB degrees have also been evaluated in Washington and Florida. In Washington, the evaluation was conducted on 35 AB programs offered in 15 colleges during the 2014-15 academic year (Kaikkonen, 2015a). This report also presents a target of 1,400 AB degree graduates by 2030, and projects the number of AB degree programs to grow from the current number to 52 AB degree programs to be offered by 23 community and technical colleges. To obtain these figures, the Washington State Community and Technical College Board (SCTCB) uses data from its state dataset to analyze and report educational enrollments and outcomes. As such, Kaikkonen reports 1403 students enrolled in AB degree programs in 2014-15, accounting for a full-time equivalency (FTE) of 947. Thus far, nearly 250 students have graduated from AB degree programs, with an 81% fall-to-spring graduation or retention rate. This rate has increased since the start of AB degree programs, a trend that Kaikkonen attributes to the growth in full-time participants. The results also provide a breakdown of outcomes by subgroups, which allows the state to determine that number of students of color is rising in AB degree programs but the retention rates for these students lags their participation rates. Therefore, whereas the notion of broadening participation to access AB degrees appears to be

taking hold, the idea of broadening participation to completion has not been realized.

In Florida, on the other hand, evaluation of the impact of AB degrees has focused on enrollment and demographic trends guided by two policy questions: 1) Are Community College Baccalaureates (CCB) fulfilling their stated policy goals of increasing access to Bachelor's Degrees in Florida, or are enrollments from the State Universities simply being redistributed?, and 2) Are CCB programs serving the same student population as state universities, or are they truly expanding access by attracting students with different demographic characteristics (Bilsky, 2014)? These two evaluation questions are important because both have policy implications for higher education in the state of Florida. If Florida´s legislative policy intends to expand access to baccalaureate degree programs through the use of the Florida College System (FCS) without affecting enrollment trends at the university system, then addressing this policy question is important.

To answer the first question it is necessary to analyze enrollment trends by program type (AA, AAS/AS, certificate, and baccalaureate) as well as to compare enrollment trends at the FCS with that of the state university system. According to Bilsky (2014), findings of an evaluation that examined this question suggest that, after implementation of CCBs in 2002, upper-division enrollments at the Florida State University System (SUS) increased by 55%, even in disciplines that potentially experienced duplication. Although the study does control for the effect of other variables that might explain the growth at the SUS, neither details the disciplines that experienced duplication, and yet, this approach to evaluation constitutes progress on the evaluation of AB outcomes at the state level.

The second evaluation question that explores changes in the demographic characteristics of students enrolled in CCB programs is pertinent because it is linked to the potential of AB degrees to serve diverse student populations, including working adults and place-bound students (Soler & Bragg, 2015). Access to baccalaureate degree programs has become a key point in Florida´s legislation (Section 1007.22 of the Florida Statutes) because it has the potential to positively impact local- and state-level economic development along with the outcomes of nontraditional students (Bilsky, 2014). Interestingly, results from the evaluation study suggest that apart from expanding access to higher education, by 2010 the CCB degree programs in Florida served student populations with very different characteristics than Florida´s public, state universities. Student population data revealed dramatic differences in terms of dependency status and expected family contribution between upper-division SUS and FCS students that are indicators for nontraditional students. Whereas 78% of SUS students enrolling in baccalaureate programs are full-time, only 13% of FCS students who enroll in similar programs are full-time. Also, while 33% of SUS are independent, the vast majority of FCS students (84%) are similarly independent (Bilsky, 2014).

It is important for institutions to define outcomes at the onset of program development and implementation because discussions along these lines can help shape future implementation efforts.

Institutional Outcomes

In the interest of offering AB degrees, many higher education institutions go through phases of exploration, planning, development, implementation, and finally, fully operational and sustained AB degree programs. It is important for institutions to define outcomes at the onset of program development and implementation because discussions along these lines can help shape future implementation efforts. For instance, some personnel associated with associate-degree granting institutions in Washington observed that state requirements to scrutinize AB degree applications were somewhat onerous but highly beneficial. Once they considered the possibility of offering AB degrees, they

asked themselves questions such as: Why are AB degrees worth offering? Why should we (the specific institution) offer them? What AB degree(s) should we offer? Who is on board with implementation? And, what contextual factors may influence our offering of AB degrees? (Cockroft, Walker, Reedy, & Melero, 2015). In discussing these questions, institutions clarify their main goals for offering AB degrees, the resources required to implement and operate them, and expected outcomes if AB degrees are operated as planned. Some initial questions that institutions should ask include the following: To what extent do these degrees reflect their mission, and are the purposes and outcomes of these degrees consistent with other institutional efforts? The degree to which institutions consider these objectives can be seen as a form of institutional effectiveness, and this form of evaluation depends on the clarity of goals and institutional willingness to set priorities and solve problems (American Council on Education, 2015).

Many higher education institutions strive to increase their effectiveness by implementing various practices and policies that bring about organizational and cultural changes. Jenkins (2007) points out that among several activities that can help community colleges to be more effective, the use of institutional research to track student outcomes and to improve program impact is crucial[3]. In the context of AB degrees, evaluating institutional outcomes means evaluating the ways policies, programs, and practices associated with AB degrees affect student success and employer satisfaction. It may also involve evaluating other institutional impacts of AB degrees, including mission change, institutional identity shifts, and the costs and benefits of AB degree programs.

Many questions can be addressed by evaluating the impact of AB degree on institutional policies, programs, and practices. Some examples of each of these three categories (policies, programs, and practices) appear below.

Policies:

- What policy changes is the institution making to offer AB degrees?
- How are AB degree programs aligned with or shifting institutional mission?
- Do AB degrees help institutions expand access to underserved student populations?
- Does the offering of AB degrees affect the identity of the institution, and if so, how?
- What policies has your institution adopted to demonstrate that AB degree programs are high quality?

Programs:

- How are various instructional settings and approaches used to deliver AB coursework and enhance student learning, particularly for non-traditional and underserved student populations?
- How does instruction associated with AB degree programs relate to the retention and credentialing of AB students?
- What outcomes do students achieve from participation in AB degree programs?
- What enrollment patterns (part- versus full-time; online versus classroom) are common to different types of AB degrees in the same institution, and across the same type of AB degrees in different institutions in a state?
- How do differences in program implementation affect outcomes associated with different AB degree programs?
- What perspectives are held by different stakeholders (e.g., students, faculty, administrators, counselors, etc.) toward AB degrees, and how do these perspectives affect AB degree program implementation and sustainability?

[3] Other practices that Jenkins (2007) links to institutional effectiveness are: student retention and outcomes, not just student enrollment; targeted support for underrepresented students; faculty development; evaluation of the effectiveness of instruction and support services; and use of evaluation findings for future improvements.

One way that institutions can evaluate the outcomes of a particular AB degree is to focus impact evaluation at the program level. In this way, the particular features of the program, the specific student groups that are enrolled, the intended outcomes of the program, and so forth, can be specified carefully enough that the evaluation of outcomes and impact can be understood relative to what the AB degree program is attempting to achieve.

- How satisfied are students and graduates toward their AB degree programs of study?
- How have employers (and employer partnerships) been involved in the implementation and sustainability of AB degree programs?
- Are employers of AB graduates satisfied with the competencies provided by institutional training?
- What are the costs and benefits of AB degrees?

Practices:

- How do college admission practices change in association with offering AB degrees?
- How do AB degrees work in conjunction with support services to improve student completion?
- What new practice(s) do institutions implement to support student participation in AB degree programs?

One way that institutions can evaluate the outcomes of a particular AB degree is to focus impact evaluation at the program level. In this way, the particular features of the program, the specific student groups that are enrolled, the intended outcomes of the program, and so forth, can be specified carefully enough that the evaluation of outcomes and impact can be understood relative to what the AB degree program is attempting to achieve. Clearly, not all AB degree programs are the same, so focusing on programs that are well understood on multiple levels, i.e., students, faculty, employer, is important to produce an evaluation that has meaning to program constituents.

Our research on AB degrees has involved the development of instruments to assess the following program level outcomes: outreach to underserved student populations, general student outcomes, employer partnerships, instructional approaches, and frequency of assessments. A copy of the full survey is available in Appendix B, but we present a summary here to illustrate the indicators selected to measure each outcome:

Evaluation of outreach to underserved student populations involves:

- gathering evidence of enrollment of the following groups: adults (individuals aged 25-64), displaced/unemployed workers, English language learners, immigrants, racial and ethnic minorities, students with disabilities, women, other
- gathering evidence that services available to help underserved student populations are helping them persist to their degree completion goals

Evaluation of general student outcomes involves measuring:

- enrollment trends
- completion trends
- employment trends
- education trajectories at the graduate level

Evaluation of employer partnerships pertaining to AB degrees involves measuring:

- the number of partnerships with employers
- the number of partnerships with associations that enhance the development of the AB degree

Evaluation of instructional approaches pertaining to AB degree programs involves measuring

- the type and number of instructional settings used in the delivery of AB coursework
- the type and number of instructional approaches used in coursework

Evaluation of the frequency of assessments at various levels involves measuring:

- student, institutional, and community needs
- student demographics
- program implementation goals
- course completion and student course grades
- student learning other than course grades
- graduate employment and enrollment in graduate school

Notice that the implementation of assessments is itself one of the institutional outcomes of AB degrees. Given the limited evidence of AB outcomes, institutions can play a key role in positioning assessment and evaluation at the center of AB degrees. Therefore, assessing whether and how institutions evaluate their own practices is a critical step ahead in developing a culture where institutions constantly track outcomes to improve program impact.

Employment Outcomes

According to Carnevale and Cheah (2015), the U.S. economy will create 55 million job openings over the 10-year period ending in 2025. Among those 55 million job openings, the Center projects that 11% of the jobs will be secured by people with graduate degrees, 24% by people with bachelor´s degrees, 12% by people with associate's degrees, 18% by people with some college and no degree, and 36% for people with a high school diploma or lesser education credential. Given the importance of some postsecondary education in the labor force, accounting for 64% according to Carnevale and Cheah, it is important to know what employment outcomes are associated with AB degrees. Also, knowing the value employers place on these degrees is important to understanding their impact on the workforce and economy.

As noted, employers are one of the key stakeholder groups of AB degrees. Employer evaluation of graduates is an important component of program evaluation and contributes a different view that is infrequently reported in the literature (Ryan & Hodson, 1992). Our own research on employers indicates that they perceive of AB degrees as valuable to their organizations because they perceive that these degrees emphasize applied coursework and applied learning with direct applicability to their workforce (Soler & Bragg, 2015). Interestingly, sometimes employers hire AB degree graduates to fill positions that they consider less than a traditional baccalaureate degree, arguing the restructuring of the workforce requires this new form of bachelor's degree that is less theoretical than a traditional baccalaureate. However, the extent to which this perspective is widely held among employers is unknown. Understanding how AB degrees are actually aligned to the skill sets and credentials that employers demand in the current and emerging workforce is important, as is measuring the wages that employers allocate to AB-degree holders with diverse work experiences.

Because several arguments for the implementation of AB policy suggest that these degrees are necessary for some communities to remain economically competitive[4], examining the employers' interest in the degree is also important. Understanding workforce need relative to credentials is important to determining the impact of these degrees, including whether AB degree graduates have higher probabilities of being employed or receiving higher wages than other graduates, either those with lower (AAS degree) or higher credentials (traditional baccalaureate or graduate degrees). Appendix C includes an employer interest survey template that can help capture initial responses from employers towards AB degrees.

[4] See for instance, Senate Bill No.850 titled "Public postsecondary education: community college districts: baccalaureate degree pilot program" Retrieved from http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201320140SB850.

The other side of evaluating employers' outcomes has to do with outcomes once AB degrees are conferred. In similarity with some of the elements used to examine student outcomes, the following indicators may provide important information to evaluate outcomes associated with employers and the labor market:

- Characteristics of employees that hold AB degrees: age, gender, race/ethnicity, socioeconomic status, professional experience
- Employment trends of AB participants and graduates by industry sector
- Wage and wage gain trends of AB participants and graduates by industry sector
- Employment trends of AB participants and graduates by occupational group
- Performance assessments of AB participants and graduates
- Employer satisfaction of AB participants and graduates

In line with the evaluation questions suggested to assess student, program, and institutional outcomes, the following questions can help guide AB outcomes evaluation relative to employment:

- Do AB degrees provide an appropriate way to meet workforce needs? In which fields?
- How do employers perceive and assess higher-order thinking skills and advanced technical knowledge of AB degree graduates?
- How do AB graduates perform, and how does their performance differ from graduates of other degree programs (e.g., AAS, traditional baccalaureate, graduate), taking into account different levels of work experience?
- How have partnerships between postsecondary institutions and employers helped AB degree graduates transition to the workplace?
- What is the effect on earnings of obtaining an AB degree from an associate-degree granting institution as opposed to a traditional baccalaureate degree-granting institution?
- What are career trajectories of AB degree graduates who have different race/ethnic, cultural, and socio-economic characteristics and diverse work histories?
- Are there any differences in employment outcomes for AB degree graduates compared to other college graduates, such as employee retention, engagement, and motivation?

Whereas little evaluation has been done on employment outcomes, Texas is a state that has offered these degrees for more than 30 years at baccalaureate-degree granting institutions and for about a decade at three associate degree-granting institutions. Given this history, the state undertook an evaluation of employment outcomes to consider further AB degree expansion. The Texas Higher Education Coordinating Board commissioned RAND Education, a unit of the RAND Corporation, to partner with the Texas Higher Education Policy Initiative to conduct the study and explore a range of policy options. Keeping consistency with the importance of developing a theory of change to describe how an intervention is supposed to deliver the desired results (See Daugherty, Goldman, Butterfield, & Miller, 2014, p. 10), a framework was developed for decision-making about higher education expansion. Daugherty et al. (2014) described the process in the following way.

> The first step is for policymakers to determine whether there is a workforce need and whether a baccalaureate is appropriate for meeting it. If there is a workforce need for more baccalaureate degrees, policymakers should then determine whether there is a sufficient supply of baccalaureate-degree-holders to meet the need. If there is not, then policymakers should focus on identifying the appropriate way to meet that need. These approaches include starting or expanding university programs, establishing community college baccalaureate [CCB] programs, or creating partnerships between universities and community colleges. If expanding community college baccalaureate [CCB] programs is warranted, then the question becomes, "Which specific institution or institutions should expand programs or introduce new programs (p. 33)?"

After defining the framework, Daugherty et al. outlined the three following research questions:

- Are there unmet workforce-development needs for baccalaureates in nursing and four applied science occupational groups in Texas?
- Do associate-degree granting institutions provide an appropriate way of meeting unmet workforce-development needs, especially those needing greater baccalaureate production in nursing or the applied sciences?
- If the state determines community college baccalaureate expansion is an appropriate means to meet unmet workforce-development needs, what process should it use to recommend and approve new programs?

The Daugherty et al. study focused on five fields of study: nursing; computer and information technology; fire sciences management; management of production/operation technicians; and health information technology. Also, the researchers selected four district regions of Texas to represent the state´s range of policy and workforce environments. Two of the regions have large urban centers, and two represent rural regions. To assess unmet workforce-development needs and understand if positions with unmet needs require a baccalaureate degree, the team interviewed more than 300 people, including employers as well as institutional leaders and departmental experts at both associate- and baccalaureate-degree granting institutions (Daugherty et al., 2014). The main findings revealed a strong demand for baccalaureate-level individuals in nursing and computer and information technology, but less demand in the other fields. These stakeholder-based findings were supported by a descriptive analysis of quantitative data on the projected number of annual positions for employees in different occupational groups, and according to the current distribution of educational attainment in an occupation. Although the identification of unmet workforce needs consisted of comparing occupational openings to educational graduates, this analysis provides an imprecise estimate of workforce shortages. Graduates are a source of supply, but there are other sources of supply such as migrants, workers re-entering the labor market, and individuals switching occupations. In describing the limitations of the study, Daugherty et al. (2014) concede that none of these groups are given adequate consideration in their methodology. Even so, Daugherty et al. note that the state may want to consider CCB degree expansion as long as the number of CCB degree programs is carefully monitored and constrained to certain fields of study. The report further recommended that universities be given the first chance to develop new baccalaureate programs and upon their refusal, require community colleges to justify how their awarding of such degrees does not constitute program duplication, along with demonstrating high quality programming and avoiding mission creep. Follow-up studies were recommended by Daugherty et al. to address these concerns.

The Washington State Community and Technical College Board evaluated post employment outcomes to assess earnings differences between AB degree graduates and the graduates of the comparable AAS degree programs for which AB graduates completed (see Kaikkonen, 2015b). The study asked whether having an AB degree results in higher earnings than having the associate's degree alone, whether the return to investment (ROI) in earnings differs by field of study, and whether the target populations for AB degrees, including historically underserved students, experience the same earnings benefits from AB degrees as majority students. The evaluation computes post program earnings differences for graduates of associate's degree programs who sought employment compared to graduates of the similar associate's degree programs who obtained an AB degree before obtaining employment. The final sample consisted of 281AB graduates, with an 84% match rate on employment records within 3 quarters following graduation, and 1,771 associate's degree graduates, with a 74% employment record match rate within 3 quarters following graduation. These results show the impact of AB degrees relative to associate's degrees on earnings by program of study, after controlling for student characteristics. In all but two programs the differences were statistically significant. The wage difference ranged from $3,682 in one college's management program

to $26,787 in another college's radiology program. The analysis offered substantially sophisticated inferential statistics to show that some of the difference in wages was attributable to student characteristics in that gender explained higher wage differences in some occupations. For example, in the case of the radiology graduates, males earned significantly more than females, pointing to gender differences in wages in specific occupations. By contrast, Kaikkonen (2015a, p. 14) reported a promising finding for underserved populations in that "there were no significant differences in earnings for students of color. This suggests that the target populations for applied baccalaureate [AB] degrees are benefitting from this level of education in the same way as their peers."

Methodological Considerations

After defining evaluation questions and selecting outcomes, the following steps in the evaluation process consist of designing an evaluation strategy, collecting data, and analyzing and reporting the findings. In carrying on these evaluation activities, it is important to consider who will conduct the evaluation. External evaluators can bring a range of expertise and experience that might not be available within the institution, but they may lack the historic and nuanced knowledge that internal evaluators possess (Rogers, RMIT University, & BetterEvaluation, 2012). External evaluators may be more independent and less influenced by fellow employees who hold strong opinions, but they may also have less access to data needed to address key questions. In regard to these issues, Rogers et al. (2012) recommend

> establishing a team of evaluators with external and internal perspectives; ensuring transparency in terms of what data are being used and how in the evaluation; and triangulation –using multiple sources of evidence (which have complementary strengths) and multiple perspectives in analysis and interpretation (p. 4).

There has been extensive debate about which methodologies to use to evaluate educational programs. Whereas some researchers prefer the use of quantitative methods, others adhere to qualitative research designs. Evaluators of educational and social programs have also expanded their methodological repertoire with designs that mix qualitative and quantitative methods (Greene, Caracelli, & Graham, 1989). In principle, the evaluation questions that we have articulated pertaining to AB degrees require all these methodological approaches.

Imas and Ray (2009) recommend articulating questions in three forms to help organize an evaluation: descriptive, normative, and cause-and-effect. First, descriptive questions provide information about the proportion of changes or about perceptions or opinions in a group. Second, normative questions compare what is taking place with a standard that indicates what should be taking place. Third, cause-and-effect questions measure what difference the intervention makes in outcomes (Gertler et al., 2011; Imas & Ray, 2009). Consequently, some methodological strategies may be more appropriate to examine certain evaluation questions pertaining to AB degree programs than others. A useful rule of thumb to make decisions on evaluation designs is to take into consideration the purposes of the evaluation, the type of evaluation questions, and the availability of resources to conduct the evaluation.

Good quality data are required to assess the impact of any program on the outcomes of interest (Gertler et al., 2011). Hence, designing a strategy to collect data in the best possible way is an important step in the evaluation process. Some common methods of program evaluation that can be used for AB degree programs include, but are not limited to, documenting student enrollment patterns using institutional records; conducting personal and focus group interviews; executing base-line and follow-up surveys of students, graduates, and employers; conducting classroom and laboratory observations; carrying out case studies involving site visits, interviews and observations; reviewing historic and current documents, including institutional and public policy records; and tracking Unemployment Insurance (UI) wage records[5].

[5] Tracking systems at the student-level collect demographic, performance, and other information that pertains to a single student, but which cannot be attributed to a specific student (U.S. Department of Education, 2015).

The creation of valid and reliable instruments to collect data almost always requires pilot testing. Involving experts in the piloting of instruments can help identify gaps and areas of improvement not considered initially but important to measure. Our research team developed numerous instruments to measure AB degree program outcomes at various levels that may be useful for future evaluations of AB degrees. Some examples of instrumentation developed by our research team are:

- Templates to help institutions report student-level data (Appendix A)
- Program outcomes surveys (Appendix B)
- Employer surveys (Appendix C)
- Student focus group surveys (Appendix D)
- Student interviews (Appendix E)

Another part of the data collection process is to determine the unit of analysis and select the sample (e.g. AB degree programs, AB students, AB graduates, employers, etc.), including how large a sample is needed to produce meaningful results. Answers to these questions depend on the type of evaluation design chosen. For instance, a quantitative design may require data from institutions that have large student enrollments and sizeable groups, which is most likely found in long-established AB degree programs. By contrast, a qualitative data collection process could involve institutions that have small student enrollments and graduates, including institutions that have newly adopted AB degree programs. In both cases, developing a data collection plan can help to ensure that the data is obtained in a timely fashion and at the needed frequency. The plan should also specify who collects the data, and how and when the data are collected.

The final steps constitute the analysis and report of results. During these phases results are organized using categories of analysis and then studied using the theories of change selected at the beginning of the process. The analysis of results should also revise if the presence of additional elements or unexpected situations might have influenced the outcomes observed. For instance, in studying AB enrollment patterns, some external influences such as an increased supply of baccalaureate programs at 4-year institutions, changes in tuition of traditional baccalaureate degrees, or an economic crisis in fields associated with AB degrees could potentially affect the results. The use of attributable indicators helps ensure that each measure is linked in some way (directly or indirectly) to the project's intent (Gertler et al., 2011), but sometimes there are unexpected circumstances that should not be disregarded and by recognizing that they exist, provide an opportunity to better understand certain outcomes.

Some common methods of program evaluation that can be used for AB degree programs include, but are not limited to, documenting student enrollment patterns using institutional records; conducting personal and focus group interviews; executing base-line and follow-up surveys of students, graduates, and employers; conducting classroom and laboratory observations; carrying out case studies involving site visits, interviews and observations; reviewing historic and current documents, including institutional and public policy records; and tracking Unemployment Insurance (UI) wage records

Subsequent to data analysis is the dissemination of results, although sharing preliminary results and securing feedback is also a valuable strategy. But, with respect to sharing final results, the elaboration of a dissemination plan encourages careful thought about ways to portray their meaning and potential impact (Gertler et al., 2011), and also to maximize their use in decision-making. Strategies to communicate the results of AB degree outcomes evaluations should consider the large number of stakeholders that has some interest in

the results, including community college personnel, university personnel, students, employers, policy-makers, and others. Results can be distributed in numerous ways, including written reports and formal oral presentations, but also webpages, blogs, webinars, roundtables, and workshops. Dissemination efforts should provide a platform to discuss findings, gather feedback, and consider future questions and concerns that deserve additional evaluation.

The last consideration that we want to offer regarding evaluation design is about the complexity of defining what good AB outcomes and impact evaluation should be. In trying to clarify the concept of quality evaluation, the five standards developed by the Joint Committee on Standards for Educational Evaluation (2015) are applicable to the study of AB outcomes[6].
They are:

1. utility standards developed to increase the extent to which program stakeholders find evaluation processes and products valuable in meeting their needs (i.e., evaluator credibility, attention to stakeholders, explicit values, timely and appropriate communicating and reporting, etc.);

2. Feasibility standards intended to increase evaluation effectiveness and efficiency (project management, practical procedures, contextual validity, and resource use);

3. propriety standards that support what is legal and right in evaluations (responsive and inclusive orientations, human rights and respect, transparency and disclosure, conflicts of interest, and fiscal responsibility);

4. accuracy standards that aim to increase the truthfulness of evaluation presentations, prepositions, and findings (i.e., reliable information, sound designs and analyses, explicit evaluation reasoning, etc.), and

5. evaluation accountability standards which encourage adequate documentation of evaluations of processes and products.

[6] Each of these standards includes several components. For additional information about the definition of each standard please go to the original publication: Joint Committee Standards for Educational Evaluation http://www.jcsee.org/program-evaluation-standards/program-evaluation-standards-statements.

Concluding Thoughts

At the beginning of this document we entertained the idea of evaluations of AB degree programs as a form of disciplined inquiry to produce information that would serve multiple stakeholders (individuals, institutions, states, employers, communities, etc.). In describing the levels of outcome of AB degree programs, we offered a number of evaluation questions that should be explored based on specifications of what the outcomes may be for these degrees. We then provided a number of practical examples of ways to evaluate these degrees, and we included some examples of tools that we have used at OCCRL to research AB degrees.

If AB degree programs continue to experience growth as they have in the past (Ruud, Bragg, & Townsend, 2010), additional evaluation questions and instruments will need to be developed. All evaluations, regardless of when they are conducted, need to be grounded in logically important questions, and they need to be carried out using meticulous evaluation designs that ensure that the purposes of the evaluation are met. As described in our introduction, these purposes include informing AB policy-making, improving AB degree programs, and promoting greater justice and equity in program outreach and impact (Greene, 1997).
A caveat that we wish to offer regarding evaluations geared toward policy-making with respect to AB degree programs is that it is important to be open to the results, whether or not they favor AB degrees. Evaluations that seek to understand the contexts in which AB degree programs are operating more or less effectively are needed, as are evaluations that speak to benefits and challenges experienced by diverse student and stakeholder groups. It is also important to understand which environmental settings are useful or detrimental to achieving impact (Rogers, RMIT University, & BetterEvaluation, 2012).

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Appendix A: Student-level Data Reporting Template

Table 1. Student Demographic Characteristics and Academic History at Time of Transfer
(1 record per student)

Variable Name	Variable Description	Response Options	Format	Notes
ProxyID	Student Proxy ID			
Race	Race/Ethnicity (older DOE definition)	1=American Indian or Alaskan Native 2=Asian or Pacific Islander 3=Black, Not Hispanic 4=Hispanic 5=Nonresident 6=White, Not Hispanic 9=Missing /Race and Ethnicity Unknown		These are the old DOE race/ethnicity categories. Because the new DOE race/ethnicity categories were implemented after Fall 2008, so we recommend using the old categories for the student outcomes data.
Gender	Gender	1=Male 2=Female 9=Missing/unknown		
DOB	Date of Birth		mm/dd/yy	
RemPreTran	Remedial Student Prior to Transfer	1=Yes 0=No 9=Missing/Unknown		Student was enrolled in a remedial class any time prior to enrolling in the BAS degree program at BSC.
FCCbCrsY	First Year enrolled in credit-bearing college-level course(s)	4-digit year	####	Provide the year of the student first enrolled in a college-level credit-bearing course related to the degree that a student was awarded prior to enrolling in the BAS degree program at BSC.
FCCbCrsTrm	First term enrolled in college-level courses	1=Fall 2=Winter 3=Spring 4=Summer 9=Missing/Unknown	#	Provide the term of the student first enrolled in a college-level credit-bearing course related to the degree that a student was awarded prior to enrolling in the BAS degree program at BSC.
NtcEarn	N Transfer Credits Earned			This number should include ALL college-level credits earned prior to enrolling in the BAS degree program at BSC. This includes college-level credits that were not transferrable to the BAS degree program at BSC.
NtcAcc	N Transfer Credits Accepted			This number should include ALL college-level credits earned that were accepted as transferrable by the BAS degree program at BSC.
TGPA	Transfer GPA		xx.xx	GPAs should be normed to a 4.0 scale. For students who have GPAs from multiple sending community colleges, GPAs should be averaged across institution and weighted by the number of credits earned at each institution.

Table 2.Term-Level Student Enrollment Characteristics and Progress in the BAS degree program at BSC (1 or more record per student)				
Variable Name	**Variable Description**	**Response Options**	**Format**	**Notes**
ProxyID	Student Proxy ID			
TermName	-	1=Fall 2=Winter 3=Spring 4=Summer		
TermYr	-	4-digit year	####	
DegProEnroll	Type of Degree Program Enrolled	1= AAS degree program at BSC 2= BAS degree program at BSC 3= Other associate degree program at BSC 4= Other Bachelor degree program at BSC 5= Other degree program at BSC 9= Missing/Unknown	#	
PellRec	Pell Grant Recipient	1=Yes 0=No 9=Missing		
NCredAtt	Number of credit hours attempted			
NCredEarn	Number of credit hours Earned			
RemCrse	Enrolled in remedial course	1=Yes 0=No 9=Missing/Unknown		
TermGPA	Term GPA		x.xx	
CumGPA	Cumulative GPA		x.xx	

Table 3. All Degree(s) Ever Earned by Students Enrolled in BAS degree program at BSC (1 or more per student)				
Variable Name	**Variable Description**	**Response Options**	**Format**	**Notes**
ProxyID	Student Proxy ID			
DGIPedID	The IPEDS ID of the previous degree granting Institution	6-digit IPEDS ID	######	Provide The IPEDS ID of the institution that student was awarded certificate/degree prior to enrolling in the BAS degree program at BSC .
DegName	Name of Degree/Certificate Earned	free text		Provide the name of certificate or degree that a student was awarded prior to enrolling in the BAS degree program at BSC.
DegType	Type of Previous Degree/ Certificate Earned	free text		e.g., Certificate, AAS,
PDegCIP	Major Field of Study associated with Previous Degree Earned	2-digit CIP code	##	Provide the 2-digit CIP code of certificate or degree that a student was awarded prior to enrolling in the BAS degree program at BSC.
DegGrantY	Year degree granted	4-digit year	####	Provide the year of previous certificate/degree grandted prior to enrolling in the BAS degree program at BSC.
DegGrantTrm	Term degree granted	1=Fall 2=Winter 3=Spring 4=Summer 9=Missing/Unknown	#	Provide the term of previous certificate/degree granted prior to enrolling in the BAS degree program at BSC.

Appendix B: Program Outcomes Survey NSF-ATE Applied Baccalaureate Degree Pathway Survey

BAS Degree Program in *Program Name*

Program History

In what year was the BAS in *program name* degree established?

Current Students

What associate degree-granting institutions do students most-often transfer from?

What types of associate degrees do these students typically have (e.g., Associate of Arts - AA, Associate of Science - AS, Associate of Applied Science - AAS, Associate of Applied Arts - AAA)?

Outreach to Underserved Student Populations

Does the BAS in *program name* formally RECRUIT any of the following underserved student populations?

Underserved Population	Yes	No	Don't Know
Adults (individuals aged 25 – 64)	○	○	○
Displaced / unemployed workers	○	○	○
English language learners	○	○	○
Immigrants	○	○	○
Racial and ethnic minorities	○	○	○
Students with disabilities	○	○	○
Women	○	○	○
Other (please specify)	○	○	○

Are services available to help the following underserved student populations PERSIST to their degree completion goals?

Underserved Population	Yes	No	Don't Know	Not Applicable
Adults (individuals aged 25 – 64)	○	○	○	○
Displaced / unemployed workers	○	○	○	○
English language learners	○	○	○	○
Immigrants	○	○	○	○
Racial and ethnic minorities	○	○	○	○
Students with disabilities	○	○	○	○
Women	○	○	○	○
Other (please specify)	○	○	○	○

Student Outcomes

Approximately how many students enroll in the BAS in *program name* each year?

Approximately how many students graduate from the BAS in *program name* each year?

Approximately how many students who complete the BAS in *program name* are employed in a related field within 6 months of graduation each year?

Approximately how many students who complete the BAS in *program name* enroll in a graduate school program within 6 months of graduation each year?

Employer Partnerships

Approximately how many employers have established formal partnerships with National Energy Center for Excellence that enhance the BAS in *program name*?

Name three of these employers, and indicate who initiated the partnership (*college name*, the employer, or unknown).

Instructional Approaches

Are any of the following **instructional settings** used in the delivery of coursework?

Instructional Setting	Yes	No	Don't Know
On-campus classrooms	○	○	○
Off-campus sites	○	○	○
Online delivery	○	○	○
Distance education not online	○	○	○
Employer/business setting	○	○	○
Other (please specify):	○	○	○

Are any of the following **instructional approaches** used in coursework?

Instructional Setting	Yes	No	Don't Know
Innovative developmental education (e.g., contextualized, accelerated)	○	○	○
Collaborative learning	○	○	○
Problem-based learning	○	○	○
Laboratory learning	○	○	○
Diagnostic-based computer-aided instruction	○	○	○
Interdisciplinary courses	○	○	○
Capstone experience(s)	○	○	○
Formalized tutoring	○	○	○
Internships	○	○	○
On-the-job training	○	○	○
Customized training	○	○	○
Other (please specify):	○	○	○

Evaluation

Which of the following evaluation efforts are systematically carried out?

Assessment Type	Never	Each Quarter or Semester	Annually	Every 2 or more years	Don't know
Assessment of student, institutional, or community needs	○	○	○	○	○
Tracking of student demographics	○	○	○	○	○
Evaluation of program implementation goals	○	○	○	○	○
Tracking of student retention	○	○	○	○	○
Monitoring of course completion and grades	○	○	○	○	○
Assessment of student learning (other than course grades)	○	○	○	○	○
Follow-up evaluation of graduates (e.g., employment, graduate school)	○	○	○	○	○
Other (please specify)	○	○	○	○	○

Impact of NSF-ATE

What difference, if any, has NSF-ATE funding made for PARTICIPATING STUDENTS?

What other differences, if any, has NSF-ATE funding had? (e.g., on the degree program; the department / college / institution in which your ATE project or center is housed; the higher education and employer partners that you work with)

What else would you like to add?

Appendix C: Employer Interest Survey

Engineering Technology Employer Interest Survey

College Name is considering offering new Bachelor of Science degrees in Engineering Technology. The program would be designed to allow current Associate of Science and Associate of Arts students to earn a BS in Engineering Technology. The college is interested in the amount of support and interest from the local community. We appreciate your willingness and time in completing this survey. If you have questions or would like additional information, please contact (contact information).

1. Name

2. Organization you represent

3. Phone number and or e-mail address

4. Do you believe that the Engineering Technology program at *college name* would enhance economic development?

5. Do you have a need for more employees with a 4-year engineering related degree?

6. Over the next 5 years, how many engineering-related job opportunities will your company have:
   - 10 or more
   - 7 to 9
   - 4 to 6
   - 1 to 3
   - None

7. Do you believe your workforce should be trained at the baccalaureate level?

8. Do you pay higher salaries for employees with an Engineering Technology background?

9. Do employees have more opportunities for promotion if they have 4-year engineering related degree?

10. Do you support the *college name* intent to develop an Engineering Technology program?

11. Would you be willing to write a letter in support of *college name* efforts to begin an Engineering Technology program?

12. Would you like a representative of *college name* to contact you directly?

Appendix D: Student Focus Group Protocol

Hello. My name is _____ (interviewer's name) _____ . I am hoping to learn about the applied baccalaureate program that you are enrolled in, and I am very pleased you are willing to meet with me. We will talk together for about 30 minutes. Before we begin, I would like to remind you that we will respect your privacy and keep your comments anonymous, but because this is a focus group there is a minor risk that you can be identified by your peers outside of this focus group. We ask that everyone keep this discussion private, but cannot guarantee that others in the focus group can keep this conversation confidential. We can stop recording or taking notes at any time, so please do not hesitate to let me know if you feel uncomfortable.

Do you have any questions before I begin? If you have any questions during the interview, please ask.

Let's get started. It would help me if you would give your first name (or a nickname or a fake name) when you make a comment, so that I can refer to you by name during the interview. However, if you don't want to do this, it's OK with me.

Enrollment and Goals:

1. How did you hear about this degree program? What were the primary factors in your decision to enroll?
2. When you started the program, what was your goal?
   (An associate degree? a baccalaureate degree? a certificate? take a class and see how it goes?)
3. What is your current goal for the program?
   (An associate degree? a baccalaureate degree? a certificate? take a class and see how it goes?)

Experiences and Persistence:

4. What resources or features of this program are most helpful to you?
5. What classes have been the most interesting? Which classes do you think will be the most useful to you? What makes those classes interesting and/or useful?
6. What are the most challenging aspects of pursuing your intended degree?
7. How do you address those challenges?

Outcomes and Next Steps:

8. What kind of job opportunities do you expect to have access to when you complete your intended degree program? Do you have a sense of what your potential earnings might be, or what placement rates are for graduates of your intended degree program? Where did you learn about job opportunities, earnings, and placement rates?
9. What type of continuing education do you expect will be available to you?

Big Picture Reflections:

10. What differences, if any, do you see between applied associate degrees, such as the one that you are enrolled in, and the traditional AA and AS degrees offered on this campus?
11. What differences, if any, do you see between applied baccalaureate degrees, such as the one that you are enrolled in, and the traditional BA and BS degrees offered on this campus?
12. What recommendations do you have for other prospective students who are considering this degree program / pathway?

Appendix E: Student Interview Protocol

Hello. My name is _____ (interviewer's name) _____ . I am hoping to learn about the applied baccalaureate program that you are enrolled in, and I am very pleased you are willing to meet with me. We will talk together for no more than 30 minutes. Before we begin, I would like to remind you that I will respect your privacy and keep your comments anonymous in our reports. I can stop recording or taking notes at any time, so please do not hesitate to ask me to do so if you feel uncomfortable. Do you have any questions before I begin?

If you have any questions during the interview, please ask.

Enrollment and Goals:

1. How did you hear about this degree program? What were the primary factors in your decision to enroll?

2. When you started the program, what was your goal?
   (An associate degree? a baccalaureate degree? a certificate? take a class and see how it goes?)

3. What is your current goal for the program?
   (An associate degree? a baccalaureate degree? a certificate? take a class and see how it goes?)

Experiences and Persistence:

4. What resources or features of this program are most helpful to you?

5. What classes have been the most interesting? Which classes do you think will be the most useful to you? What makes those classes interesting and/or useful?

6. What are the most challenging aspects of pursuing your intended degree?

7. How do you address those challenges?

Outcomes and Next Steps:

8. What kind of job opportunities do you expect to have access to when you complete your intended degree program? Do you have a sense of what your potential earnings might be, or what placement rates are for graduates of your intended degree program? Where did you learn about job opportunities, earnings, and placement rates?

9. What type of continuing education do you expect will be available to you?

Big Picture Reflections:

10. What differences, if any, do you see between applied associate degrees, such as the one that you are enrolled in, and the traditional AA and AS degrees offered on this campus?

11. What differences, if any, do you see between applied baccalaureate degrees, such as the one that you are enrolled in, and the traditional BA and BS degrees offered on this campus?

12. What recommendations do you have for other prospective students who are considering this degree program / pathway?

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