



WBL in Two-Year Colleges: What's in a Name?

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Abstract: Workplace-based learning (WBL) provides participants with a valuable experiential learning opportunity to apply knowledge from the classroom to a real-world business or industry location. Yet despite calls to invest in or expand WBL opportunities in two-year institutions, no standard language or definitions appear to exist. Literature and research on WBL in two-year institutions is scant, and what is available suggests a lack of a common lexicon but does not address why it persists. This mixed-method study, using the Advanced Technological Education (ATE) program as its sample, addresses this gap and provides further insight into WBL language. Study results confirm that the language used to define and describe different types of WBL lacks standardization; ATE projects use various terms for WBL opportunities, with no clear pattern of characteristics distinguishing among types of WBL. The choice of terms for particular types of WBL opportunities is driven not by the opportunities' goals and characteristics but by external factors. The response to whether language in WBL matters also varied across the study population. This article concludes by reviewing the potential implications of these findings for research and practice and suggesting what can be done now to capture the impacts of workplace-based learning.

Keywords: internship, apprenticeship, externship, co-op learning, workplace-based learning

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Introduction

As part of their commitment to growing the nation's skilled technological workforce, many two-year colleges offer students valuable opportunities to engage in workplace-based learning (WBL) while completing career and technical education programs, associate degrees, and other industry-approved skills- and credential-based pathways to gainful employment. Connecting classroom instruction with the workplace in such a way is particularly beneficial for science, technology, engineering, and mathematics (STEM) fields, where jobs are in high demand, require technical expertise, and feature a knowledge base that is constantly evolving and advancing [1]. As recognition of the potential benefits of WBL grows, federal policy initiatives, industry leaders, and educators have called for sustaining and expanding funding for WBL at two-year institutions and for more research on the impacts of WBL on students' professional and educational outcomes [2-4]. Yet, despite these calls, no standardized definition of WBL exists. Yet, despite these calls, no standardized definition of WBL exists.

Nascent research examining WBL language has identified potential implications arising from this lack of standardized lexicon in community colleges. This work has identified issues such as the challenges for measuring and reporting student outcomes, impediments to advancing WBL research, and barriers to developing shared standards and expectations among industry partners, students, and educational institutions [5]. While this research sheds light on an important issue, especially given calls to diversify and expand WBL opportunities, it does not provide insight into why non-standardized language persists, nor into the perspectives of WBL practitioners on the need for a common lexicon in two-year institutions [5-7]. We conducted a mixed-methods study to address this gap and facilitate conversations about its potential impacts on STEM education. Our study collected and analyzed engagement in WBL activities and nomenclature amongst principal investigators in the National Science Foundation's (NSF's) Advanced Technological Education (ATE) program.



Background

In the existing literature, WBL definitions tend to converge around WBL, serving as an opportunity for students or workers to transfer classroom knowledge to a workplace setting. Examples of WBL definitions from various sources are shown in Table 1. However, the types of models that constitute WBL and how they are defined vary widely in the literature and among practitioners. For example, Cahill [8] reports that different types of WBL include internships, apprenticeships, on-the-job training, co-ops, and transitional jobs tied to classroom instruction and may or may not provide academic credit and payment. Rodriguez et al. [9] likewise identify apprenticeships and internships as WBL, but they also include clinical placements, school-based enterprises, service learning, and community-based learning as types of WBL.

Table 1. Definitions of WBL Across Institutions of Higher Education and National Organizations

Source	Definition
The Academic Senate for California Community Colleges [10]	“an education strategy used to connect classroom instruction to careers by providing students with opportunities to reinforce and make relevant their classroom experiences.” (p.1)
Western Piedmont Community College (WPCC) [11]	“an opportunity to receive college credit for on-the-job experience. The work experience, conducted under the direction of WPCC, must be significantly related to the student’s program of study.”
Community College of Denver [12]	“a teaching methodology that blurs the lines between school and work” and includes activities that “provide a learner with hands-on experience that allows them to apply the knowledge of the classroom in a simulated work environment.”
The Federal Partners in Transition [13], a group of federal agencies that formed the National Collaborative on Workforce and Disability for Youth	“a supervised program sponsored by an education or training program that links knowledge gained at the work site with a planned program of study.” (p.1)
Jobs for the Future [14], a non-profit examining and promoting workforce development	“an approach to training in which a student or worker completes meaningful tasks in a workplace.”

WBL definitions and types of opportunities considered WBL also vary across educational institutions and federal and state government levels. For example, while some institutions characterize an internship as a short-term, unpaid opportunity tied to a specific course, others characterize an internship as a long-term, potentially paid opportunity that does not have to be associated with academic coursework [5, 8, 9]. A review by Giffin et al. [15] at the College and Career Readiness and Success Center at the American Institutes for Research found variations in how WBL activities are identified and described. Their review found that only two state labor or workforce departments (Illinois’s and New Hampshire’s) had formal definitions for WBL, and 19 out of 23 national organizations that identified WBL as a priority had publicly available definitions for WBL [15]. The closest that any type of WBL comes to having uniform characteristics and using standardized language is the U.S. Department of Labor’s (DOL) Registered Apprenticeships [16]. Overseen and recognized by the DOL’s Office of Apprenticeships in conjunction with state apprenticeship agencies, DOL Registered Apprenticeships are designed to meet strict guidelines and specific industry standards [16].

Research on WBL has provided little guidance to inform the development of WBL frameworks or definitional criteria, but the potential consequences of unstandardized language have surfaced. One consequence is the inability to measure, understand, or translate WBL outcomes, especially across different contexts and types of WBL. Lucero et al. [4] conducted a literature review examining internship characteristics and program outcomes at community and tribal colleges. Their findings showed that programs utilized a broad range of student and employer outcomes to gauge WBL experiences and found little overlap among the outcomes used by these institutions [4]. Other reviews of WBL outcomes were limited or showed mixed results [5].



In recognition of the lack of clarity for WBL outcomes and few empirical research studies on WBL benefits, some WBL researchers and advocates have made calls to standardize WBL language [5, 8, 10]. Given these calls and limited research on WBL, an opportunity exists to examine perceptions among those responsible for administering or otherwise supporting WBL activities in two-year institutional contexts.

Methods

Research Questions

To better understand WBL in two-year institutions, our study was guided by four research questions:

1. What types of workplace-based learning (WBL) opportunities are offered by Advanced Technological Education (ATE) projects?
2. What characteristics differentiate the types of WBL offered?
3. Why do ATE projects use certain terminology for their WBL opportunities?
4. Does WBL language matter? Why or why not?

Design

We utilized an explanatory sequential mixed-methods design. This involved collecting and analyzing quantitative data, then collecting and analyzing qualitative data to help explain the quantitative results and answer the complete set of research questions [17]. In the first phase of this study, we surveyed NSF-funded ATE projects regarding their WBL practices. In the second phase, we selected a purposeful sample of survey respondents for structured interviews to better understand survey responses.

Population

This study was conducted within the context of the NSF ATE program. The ATE program is particularly well-suited to explore the topic of WBL language, given its reach through funding projects across the United States and U.S. territories and its focus on STEM and skilled technological workforce development in primarily two-year institutions, which frequently offer WBL opportunities as part of their workforce education pathways.

Data Collection

Quantitative data was collected from ATE principal investigators (PIs) through the annual ATE Survey. First launched in 2000, the ATE Survey collects and disseminates data on ATE projects' activities and accomplishments during the previous calendar year. This long-standing data collection mechanism was used to collect data for this study because of its generalizability to the ATE population, given historically high response rates of over 90%.

Data used for this study is from a survey section entitled "Workplace-Based Learning (WBL)," which first appeared in the 2019 ATE Survey. WBL is defined in the survey as a situation in which a student gains experience at a work site. Working Partners Research Project, an ATE grantee, conducted a survey and focus groups of ATE projects in 2016-17, which indicated five different types of WBL. These five types were then permanently integrated into the ATE Survey and included job shadowing, externships, internships, co-op learning, and apprenticeships. Definitions for WBL options in the ATE Survey were intentionally not provided to allow respondents to provide details of their specific activities rather than their labels. For each type of WBL opportunity that they reported offering students, survey respondents were asked to report the number of hours per week and the number of weeks per year that students were engaged, the total number of students who participated, if academic credit or payment was provided, if participation was required by an academic program, and if it was coupled with a specific course(s).

Survey data for this analysis were drawn from the 2020 ATE Survey and represent activities conducted from January 1, 2019, through December 31, 2019. Survey respondents completed the survey between February 2020 and May 2020 online via the Qualtrics survey software. To ensure that the data used in this study was not an anomaly or outdated, we also analyzed data from the WBL section of the 2021 and 2022 ATE Surveys. We found no meaningful differences in the types of WBL opportunities offered, who offered them, or how these opportunities were characterized by respondents (i.e., students received academic credit or payment, participation required, coupled with a course). This indicates that findings from the 2020 ATE Survey align with more recent surveys and are not an outlier.



Given the study's sequential design, the qualitative phase of the study was informed by and conducted after the quantitative phase. We developed a structured interview to clarify survey results and better understand the respondents' applied definitions of WBL opportunities and activities. Interviewees were asked to confirm their survey responses (i.e., type of WBL offered, number of students participating, payment or academic credit provided, participation required or not), describe the origins of the name of the type of WBL offered (e.g., why an internship is called an internship) and how it differs from other types of WBL that they offer. Interviewees were also asked to define each type of WBL opportunity, regardless of whether they offered them or not, talk about their experiences with inconsistent WBL language, if any, and discuss the potential implications of unstandardized WBL language on students, institutions, or the STEM field.

Sample

The survey was a census of the 325 ATE-funded projects identified by NSF in 2020, of which 294 projects responded. Out of 294 projects, 76 indicated that they offered WBL to students, while 218 did not offer WBL. As Table 2 shows, these 76 ATE projects were primarily at two-year institutions distributed across the United States, and they provided programming in a variety of STEM disciplines. Over one-third of ATE projects that offered WBL were located at minority-serving institutions, with most representing Hispanic-serving institutions (n=26) and none representing historically black colleges and universities (HBCUs).

Table 2. Quantitative Sample Characteristics, by Survey Respondent

Region (n = 76)	
South	29
West	25
Midwest	13
Northeast	9
Institution Type (n = 76)	
Two-year college	65
Four-year college	10
Non-profit organization	1
Minority-Serving Institution (n = 76)	
Yes	29
No	47
Minority-Serving Institution Type (n = 29) ^a	
Hispanic-serving institution	26
Native Hawaiian-serving institution	2
Tribal college or university	1
STEM Field (n = 76)	
Information and securities technology	20
Engineering technologies	20
Advanced manufacturing technologies	13
Agricultural and environmental technologies	9
Bio and chemical technologies	7
General or interdisciplinary	6
Micro and nanotechnologies	1

The remaining 47 ATE projects were not minority-serving institutions.

A purposeful saturation sampling strategy utilized six inclusion criteria to identify interviewees from the 76 ATE projects who reported offering WBL on the 2020 ATE Survey. Criteria included number and types of WBL opportunities offered; institution type; ATE project type (e.g., funded as a project or as a regional



center); apprenticeship type (i.e., DOL Registered Apprenticeship or not); number of students served; and type of NSF ATE grant (i.e., project, center, small new-to-ATE). ATE projects were selected based on their ability to meet these criteria. We oversampled ATE projects that offered multiple types of WBL to understand how WBL types were differentiated from one another at the same institution. These criteria and the study design, which emphasizes the ability of qualitative data to provide insight into quantitative findings over a large sample, led to an initial sample of 10 PIs and co-PIs from 10 different projects. Figure 1 provides an overview of the sampling process. They were invited to participate in the study via email. Two PIs did not respond; one PI was no longer associated with the grant, and one PI's email address was no longer active. The final sample consisted of 10 individuals across the six ATE projects. One project included five different institutions that served as sub-awardees, and it was decided to interview one person at each institution because of their diverse geographic locations and autonomous operating structures. Please note that subawardees do not complete the annual ATE Survey, so these five institutions are not represented in Table 2. After interviewing all ten individuals and analyzing the resulting data, no additional information was revealed, indicating that our sampling strategy was achieved. As a result, no additional ATE projects were interviewed [18].

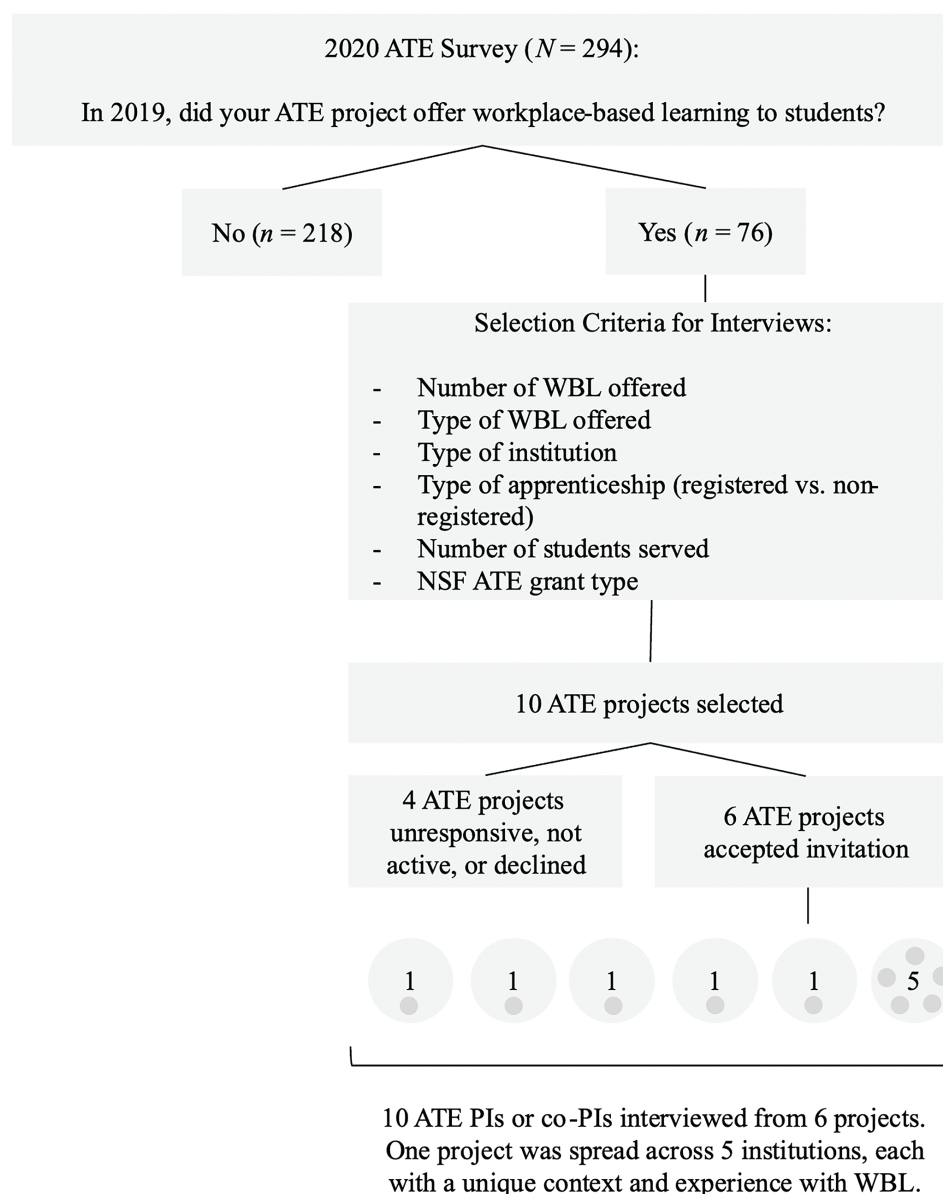


Fig. 1. Final sample selection for qualitative interviews with PIs using the 2020 ATE Survey



Table 3 displays the characteristics of the final sample of 10 interviewees and shows that they represented a range of STEM disciplines and were located in diverse areas. Most offered one type of WBL, primarily internships.

Table 3. Qualitative Sample Characteristics, by Interviewee

Region (n = 10)	
South	3
West	1
Midwest	1
Outside of continental USA	
American Samoa	1
Mariana Islands	1
Marshall Islands	1
Micronesia	1
Palau	1
Institution Type (n = 10)	
Two-year college	9
Four-year college	1
Offered Multiple WBL Types (n = 10)	
Yes	2
No	8
Types of WBL Offered by Project (n = 10)	
Internship	8
Externship	1
Co-op learning	1
STEM Field (n = 10)	
Information and securities technology	1
Engineering technologies	1
Advanced manufacturing technologies	1
Agricultural and environmental technologies	5
Bio and chemical technologies	1
General or interdisciplinary	1

Data Analysis

We analyzed survey data using SPSS. Analyses were primarily descriptive, including frequencies and cross-tabulations. Interview data were analyzed using MAXQDA 2020 software. One author served as the primary coder and utilized a two-cycle inductive coding process that employed both concept coding and descriptive coding before identifying patterns in the codes and aggregating them into larger thematic categories. Descriptive



coding uses short, descriptive words or phrases to label themes within qualitative data to provide an overview of topics and ideas discussed [19]. Concept coding allows analysts to identify underlying constructs, or concepts, that are at play in the phenomenon being studied to form a broader understanding [19]. The second and third authors reviewed all codes, categories, and patterns that emerged for accuracy and reliability.

Results

In this section, we provide a summary of results by research question.

What Types of WBL Are Offered by ATE Projects?

Survey data indicated that the majority of WBL offered by ATE projects fell into four groups: internships (82%), co-op learning (18%), job shadowing (17%), and apprenticeships (16%) (Figure 2). Only 3% of ATE projects offered externships to students. Except for externships, a mix of STEM fields was represented across WBL types.

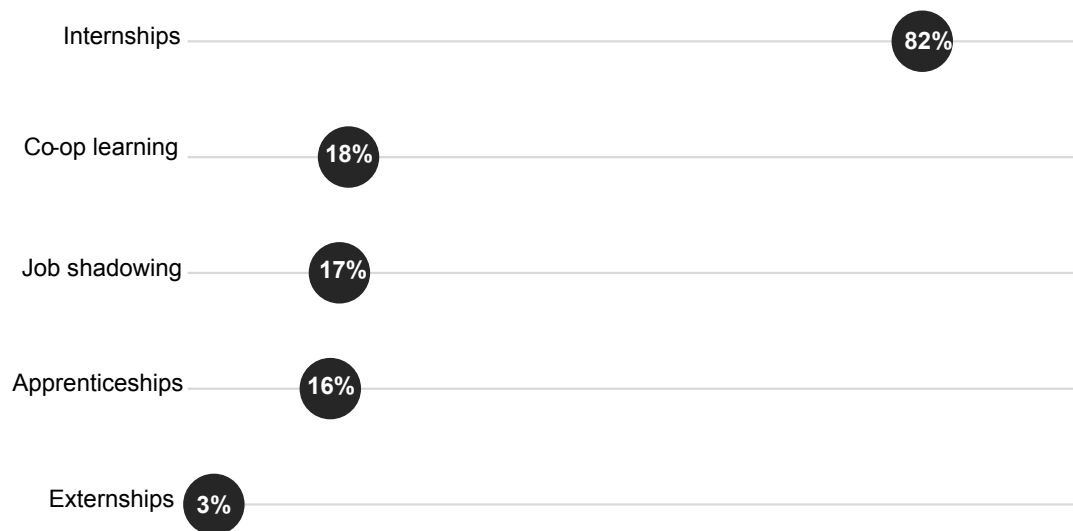


Fig. 2. Percent of Survey Respondents Offering WBL by Type (n=76)

What Characteristics Differentiate the Types of WBL Offered?

Survey results indicated that DOL Registered Apprenticeships and job shadowing came closest to having the same characteristics identified for them across different institutions. As shown in Table 4, a majority of ATE projects offering DOL Registered Apprenticeships coupled these opportunities with specific courses, academic credit, and payment. A majority of ATE projects participating in job shadowing did not offer students payment or academic credit, required participation, or couple the WBL opportunity with specific courses. Co-op learning tended to provide students with academic credit for participation, but no other common characteristics emerged. No clear pattern of characteristics emerged for internships, as 50% to 60% of ATE projects indicated each characteristic. With only two ATE projects reporting on externships, larger implications about characteristics for this WBL type cannot be meaningfully drawn.



Table 4. Characteristics of ATE Projects' Workplace-Based Learning Opportunities (n=72)

WBL Type	Total number of respondents engaged in this type	Students received payment	Students received academic credit	Coupled with specific course(s)	Participation required by program
Internships	62	65%	66%	55%	53%
Co-op learning	14	50%	71%	57%	64%
Job shadowing	13	15%	23%	23%	38%
Apprenticeships					
Non-registered	4	25%	25%	50%	25%
Registered	8	75%	100%	88%	50%
Externships	2	100%	100%	100%	100%

While some loose patterns may emerge from the characteristics held by ATE WBL opportunities, there is enough variation to throw into doubt whether the experiences that students receive are similar from one internship to another, or one co-op learning opportunity to another.

Similar to WBL characteristics, the number of hours and number of weeks per year that students engaged in WBL was not a reliable differentiator among different types of WBL opportunities. The box and whisker plots in Figure 3 show that the number of hours students engaged in different types of WBL opportunities varied, with apprenticeships, internships, and job shadowing having the largest range. The average time commitment was highest for apprenticeships (964 hours per year, approximately 18.5 hours per week). Apprenticeship time commitment also varied the most widely among programs, with a minimum of 320 hours per year (6 hours per week) and a maximum of 2,080 hours per year (40 hours per week). In comparison, internships required an average of 237 hours per year (4.5 hours per week), co-ops an average of 123 hours per year (2.3 hours per week), and job shadowing an average of 108 hours per year (2 hours per week).

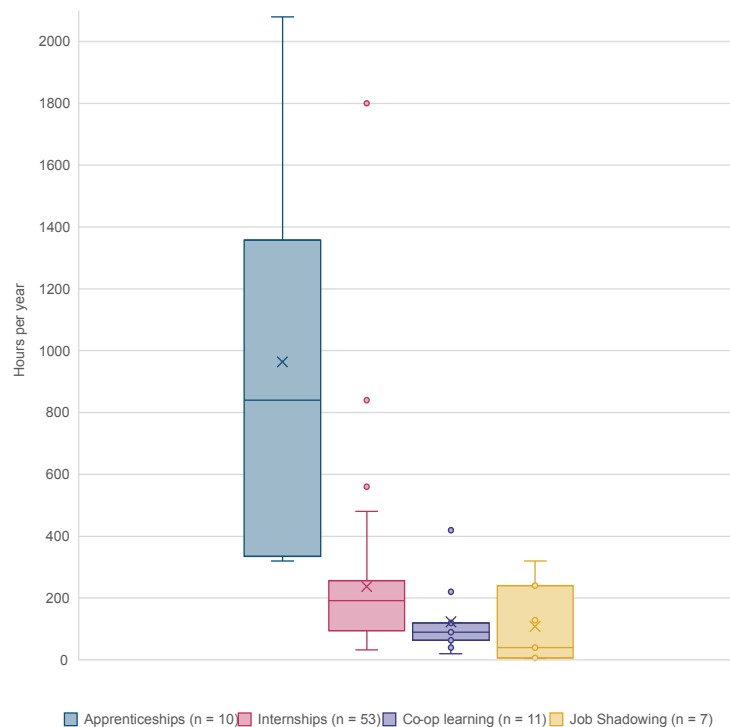


Fig. 3. Number of Hours per Year Students Engaged WBL Opportunities by Type



Interviews largely mimicked survey results and showed a lack of differentiation among the different WBL types. When asked to define the terms "internship," "co-op learning," "job shadowing," "apprenticeship," and "externship," regardless of the type(s) of WBL their own project offered, interviewees struggled to identify definitions, especially for externships and co-op learning. For example, when asked to define externship, one interviewee responded, "I've never heard that term before. I don't know what to think," while another interviewee noted, "I've never personally used that, and I've never run across it." Out of all WBL types, apprenticeships came closest to being defined consistently across different institutions compared to other WBL types. A majority of interviewees defined apprenticeships as closely aligned with a particular industry and identified them as longer-term, structured opportunities that may be connected to certification or credentialing programs.

In contrast with the ATE Survey, which used characteristics such as receipt of payment or academic credit to define and describe different types of WBL, interviewees stressed the purpose or goal of the opportunity. For example, four interviewees reported that internships were opportunities to gain hands-on experience. As one interviewee said, internships are a "hands-on activity to upgrade their skills" that helps ensure that "their skills aren't stuck" when they get into the real world. Two interviewees noted that an apprenticeship led to a specific credential. As one interviewee noted about apprenticeships, "I think about a structured long-term program leading to a state or other government-endorsed credential." Interviewees reported the same purpose or goal for various types of WBL, which was to enhance or develop participants' skills.

Interviewees did not view WBL opportunities as activities that targeted students enrolled in academic programs. For example, one interviewee characterized an apprenticeship as representing "a specific rank and level" (more specifically, as an apprentice, "you are a beginner at this job, and you are in that job") rather than an opportunity directed toward degree-seeking students. One interviewee defined externships as activities to enhance educators' skills rather than students': "Teachers will go out and do an externship in the summer to enhance their abilities." Thus, as in the survey findings, no clear pattern of characteristics that were cited by interviewees, such as purposes or goals and target audience, emerged that would help differentiate WBL types from one another.

Why Do ATE Projects Use Certain Terminology for Their WBL?

To explore how naming conventions of WBL types arise, each interviewee was asked to identify the origins of nomenclature used for the WBL types supported by their project. More specifically, why is an internship, for example, called an internship, and has it always been called an internship? Two patterns emerged from this analysis.

First, interviewees reported that what a WBL opportunity is called in their institution is driven by its ability to facilitate understanding and communication among students, faculty, or external entities. "Internship is something that's kind of standard across the board," one interviewee reported, "I think a lot of people understand what that is, and so it makes sense that they would use that." The understanding facilitated by terminology may also be rooted in the institutional history of a school or program, reinforcing and normalizing its usage. As one interviewee stated, "We've only ever referred to it as an internship." Another remarked that the WBL terminology was "definitely what it was called before I came in; I believe that it's written into the grant as an internship."

A second pattern revealed that what a particular type of WBL opportunity is called is dictated by terminology used by external organizations, specifically employers. Academic programs' language matched the various lexicons used in the industry settings they worked. As one interviewee succinctly stated, "I use the business term 'internship' because they like that." Thus, the nomenclature used to differentiate one WBL type from another is partially dictated by its ability to easily translate into the familiar language of the workplace or employer.

Does WBL Language Matter? Why or Why Not?

Interviewees offered arguments both supporting and negating the idea that the names and terms used to describe and identify types of WBL matter. The most frequently cited reason WBL nomenclature matters, identified by four interviewees, was that it provides standardization that facilitates shared understanding and application across contexts. One interviewee suggested that common terms help to facilitate the assessment of students' experiences and the transfer of credit when changing academic programs, stating, "If you don't have



a clear outline and definition of what something is, I, as chair of assessment, cannot approve that as a transfer from that institution to this institution, unless I know exactly what it means.” Another interviewee noted that standardized language “could help clarify what students are doing” in a WBL opportunity and thus facilitate shared expectations with industry partners; this interviewee explained, “If we can't communicate correctly to our community partners what we want our students to do, how are they - how are we - expecting them to actually do it?”

Standardization also fosters an understanding of what WBL participants have achieved upon completion of the activity. One interviewee likened the need for WBL standardization and the clarity it provides to the benefits provided by other standardization efforts occurring across academia. They compared it to “the whole micro-credentialing concept, where things are sort of standardized, and I know this person has ‘x’ credential, so I know exactly what they've done, I can look at the outcomes that they've achieved.”

Standardizing WBL language was also seen as potentially beneficial for educators who pursue professional development related to WBL. One interviewee noted that if the terms and characteristics for various WBL types were consistent, newly acquired information could more easily be shared across one's home institution and used to support the building of WBL effectiveness.

Five interviewees noted that specific language is not always demanded in certain contexts or environments, and as such, language concerning WBL language is not of concern. In fact, using precise or specific language for WBL that would distinguish WBL types was seen as potentially leading to administrative burdens and other challenges. As one interviewee, in speaking of a multi-institutional collaboration, noted, “Because of the different challenges each college has ... and the way that it still works ... is to leave as much flexibility in the wording so that each school can use that allotment of internship funding for what works for their school in their situation.”

Two interviewees felt that language matters less than the opportunities that WBL offers students, with one stating, “As long as there's something going on, and something [students] can benefit from and learn from, I don't care what you call it.” Thus, while interviewees identified reasons why WBL language mattered, they also identified reasons why uniform language was not needed, indicating a lack of consensus on the topic.

Discussion

Similar to WBL definitions in the literature and those used in practice by educational institutions and government bodies, findings from this study indicate that WBL opportunity types are not clearly or consistently differentiated from one another. As evidenced by survey results, while some loose patterns emerged for the characteristics of WBL types reported by the ATE community, there was enough variation to prevent clear, defining characteristics that would distinguish one WBL type from another. For example, at least half of all internships and co-op learning opportunities offered students payment and academic credit, were coupled with a specific course, and were required by the academic program. The lack of clearly defined types of WBL opportunities contributes to the lack of standardized language that characterizes WBL. The only type of WBL to demonstrate consistency in survey responses was DOL Registered Apprenticeships, a consistency that may be tied to the guidelines and regulations set forth by the government for these opportunities.

Interviews with a subset of survey respondents confirmed the absence of any unifying theme in definitions of WBL types across different institutions. When asked to define five types of WBL, interviewees' answers described the purpose of the opportunity or whom it targeted (e.g., students, displaced workers) rather than features such as payment or academic credit received as asked about in the survey. Like survey results, no clear pattern emerged in interviews that would distinguish WBL types, even when interviewees used their own framework to define WBL types.

The lack of standardization of definitions for types of WBL reflects the varying institutions, policies, and industrial environments that support them. Interviews revealed that WBL nomenclature is often a function of external conditions, such as historical norms or administrative restrictions, or mimics terminology that is easily translated to industry partners rather than being descriptive of the WBL activity itself. As a result, WBL terminology is context-dependent and fails to detail common, standardized features of an activity that would help distinguish the goals of one WBL type from another. Internship characteristics, for example, were defined differently by survey respondents, and their purpose, as articulated by interviewees, also varied. Thus, the purpose of internships, whom they engage and why, the skills developed, or the outcomes targeted may



vary widely from school to school and even program to program. This reiterates previous research that found a lack of shared WBL definitions at state, national, and organizational levels while providing new insight into why and how this is occurring [15]. Rather than being grounded in a well-defined body of literature that has reached a basic level of consensus among scholars and practitioners about what does and does not constitute a particular activity, WBL language emanates from the needs and requirements within a specific two-year institution or program.

When we asked interviewees whether variation in WBL nomenclature mattered, as with definitions of WBL types, no clear picture emerged. Some interviewees noted that students and faculty benefit from standardized language as this facilitates a shared understanding of the purposes of different opportunities clarifies expectations for both students and industry partners, and also allows school administrators, students, and faculty to translate their experiences to transfer programs and the marketplace. Thus, standardized language is viewed as benefiting multiple groups and individuals engaged in WBL while helping participants achieve shorter-term outcomes, such as attaining academic credit, or longer-term outcomes, such as earning transfer credit or recognized industry experience. This suggests that language is connected in meaningful ways to aspects of the opportunity itself. Conversely, other interviewees noted that WBL nomenclature did not pose barriers for participants, and standardization may create adverse effects for administrative processes that are bounded by specific rules and terminology. Interestingly, none of the interviewees cited assessing WBL outcomes for students, faculty, or industry partners on an individual or broader level, such as across their department, institution, or region, as a reason to standardize WBL language or not. Instead, answers were focused on the individual level.

Given the variation in definitions and naming conventions of WBL opportunities, differences in respondents' opinions concerning whether these differences mattered are not surprising. Standardization has never occurred in WBL across two-year institution landscapes in the United States, and given the scarcity and recency of literature examining WBL nomenclature and its various implications, a culture of standardization in this arena is absent. Policies funding WBL have also failed to set an expectation or highlight the need for standardized language, although some school administrators are calling for change [3, 20]. Further, failing to address the potential implications of WBL language on students' employment and educational trajectories impacts many individuals, especially female, first-generation, low-income, and racial and ethnic minority students, whom community colleges disproportionately serve [6].

Conclusion

Results from this study have important implications for school administrators, educators, and WBL researchers within and outside of the ATE community. Advocates of WBL have called for more research examining the outcomes of student and program participation in WBL [6, 15, 21]. Understanding WBL outcomes in two-year institutions is particularly important because programs offered in these settings focus on preparing a diverse student body to transition directly into middle- or high-skilled jobs, such as those in STEM. However, a lack of consensus on WBL definitions and nomenclature hampers research efforts to identify and scale best practices across diverse contexts and support the development and achievement of a range of WBL outcomes [5, 21]. For example, different educational settings and programs may identify and track the same outcomes, but if differing definitions of WBL are utilized, aggregating these outcomes to draw meaningful conclusions or lessons learned is not plausible. Previous research has already surfaced this issue by finding either no outcomes being reported or a lack of uniformity among them [5, 17].

The ability to demonstrate WBL outcomes, such as benefits to students, industry employers, and local economies, is particularly important given recent calls from both industry and educators to sustain and expand funding for WBL in two-year institutions [6, 9, 21]. Federal policy initiatives such as the Workforce Innovation and Opportunity Act of 2014 and Perkins V have renewed past efforts to expand the school-to-work pipeline, while government programs, such as NSF's ATE program, have helped strengthen technician education and student opportunities such as WBL [1-3, 22]. These calls for expanded or continued funding for WBL will inevitably be accompanied by requirements to collect evidence of program impact and outcomes. Meaningful WBL outcomes necessitate standardized WBL definitions and language, and without them, the ability to build an evidence base for WBL benefits is limited.



Although formal, uniform terminology for various types of WBL is unlikely to occur in the immediate future, current work in this area can begin now. School administrators and faculty can begin by clarifying the purposes and characteristics of WBL opportunities offered at their institutions and then look more broadly. Are expectations aligned across schools, students, and industry? How do these experiences and the language used to describe them map onto industry credentials and requirements? Addressing these questions sooner rather than later is advantageous, given the demand for STEM jobs, quickly evolving industry needs, and growing support and interest in WBL opportunities in two-year institutions. Given the experiential nature of WBL, business and industry leaders should also be involved in answering these questions and discussing WBL terminology and any efforts to standardize it.

Lastly, school administrators, industry, and others involved in overseeing or engaging in WBL could also explore developing a classification system for WBL types that would allow students to meaningfully communicate their experiences and researchers to study them without creating or standardizing language. A classification system could include categories such as payment or academic credit received, placement types (e.g., early or advanced program internships), duration (i.e., short or long-term), and rotation (i.e., stays at same employer or engages with multiple employers). This type of system could be instituted within a department or program, institution, or even on a broader level such as a region. Doing so would allow for a meaningful comparison of outcomes (e.g., student, employer) and, in doing so, a way to demonstrate WBL's impact.

Limitations

This study is not representative of all two-year institutions or STEM disciplines in the United States. While our work confirmed previous findings about WBL language and uncovered potential reasons why inconsistent terminology may be occurring, it does not capture the extent of ambiguity around naming conventions of WBL types nationwide. We also recognize that five interviewees were drawn from the same ATE project. Despite differences among them, such as the different locations and institutions, there may be similarities that were not accounted for.

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References

- [1] K. Lowry and T. Thomas-Anderson, "How community colleges are closing the skills gap through CTE and STEM funding innovations," *New Dir. for Community Coll.*, no.178, pp. 45–54, 2017, doi: 10.1002/cc.20252.
- [2] A. Atwell, W. Ecton, S. Klein, M.M. D'Amico, and C. Sublett, "Community college responses to align career and technical education programs with changing labor markets," *New Dir. for Community Coll.*, no. 197, pp. 45–58, 2021. doi: 10.1002/cc.20496.
- [3] E. Cushing, D. English, S. Therriault, and R. Lavinson. "Developing a college- and career-ready workforce: An analysis of ESSA, Perkins V, IDEA, and WIOA," American Institutes for Research, Washington, D.C., USA, June 2019. Accessed: April 1, 2024. [Online.] Available: <https://eric.ed.gov/?id=ED602409>
- [4] J.E. Lucero, S. Gallego, C. Hedgepeth, and D. Sanders, "Structure and characteristics for successful outcomes: A review of community college internship programs," *Community Coll. Review*, vol. 45, no. 2, pp. 103–116, Aug. 2021, doi:10.1080/10668926.2019.1647901.



- [5] S. Spaulding, I. Hecker, and E. Bramhall. “Expanding and improving work-based learning in community colleges: Better data and measurement to realize goals for students and employers,” Urban Institute, March 2020. Accessed: April 1, 2024. [Online.] Available: <https://www.urban.org/sites/default/files/publication/101781/expanding20and20improving20work-based20learning20in20community20colleges.pdf>
- [6] American Association of Community Colleges, Association of Community College Trustees. “Joint legislation agenda for the 117th Congress (2021–2022): Advancing America’s community colleges.” Accessed: April 1, 2024. [Online.] Available: https://www.aacc.nche.edu/wp-content/uploads/2021/03/ACCT8151_Joint_Legislative_Agenda3.pdf
- [7] J. Toglia. “What we know about equity and diversity in apprenticeship,” Jobs For The Future (JFF), May 11, 2018. Accessed: April 1, 2024. [Online.] Available: <https://www.jff.org/wp-content/uploads/2023/09/Lit-Review-091517.pdf>
- [8] C. Cahill. “Making work-based learning work,” Jobs For The Future (JFF), July 2016. Accessed: April 1, 2024. [Online.] Available: <https://www.jff.org/resources/making-work-based-learning-work/>
- [9] J. Rodriguez, H. Fox, and H. McCambly. “Work-based learning as a pathway to postsecondary and career success. Insights on Equity and Outcomes,” Office of Community College Research and Leadership, Issue 18, Oct. 2016. Accessed: April 1, 2024. [Online.] Available: <https://eric.ed.gov/?id=ED574535>
- [10] Academic Senate for California Community Colleges. “Work based learning in California community colleges,” Spring 2019. Accessed: April 1, 2024. [Online.] Available: https://www.asccc.org/sites/default/files/Work_Based_Learning.pdf
- [11] Western Piedmont Community College. “Work-based learning.” Accessed: April 1, 2024. [Online.] Available: <https://wpcc.smartcatalogiq.com/en/2018-2019/Catalog/Associate-in-Applied-Science-Degrees/Work-based-Learning>
- [12] Community College of Denver. “Work-based learning and hiring.” Accessed: April 1, 2024. [Online.] Available: <https://www.ccd.edu/org/center-workforce-initiatives>
- [13] Federal Partners in Transition. “What to know about work-based learning experiences for students and youth with disabilities,” November 2015. Accessed: April 1, 2024. [Online.] Available: <https://youth.gov/sites/default/files/FPT-Fact-Sheet-Work-Based-Experiences-11-5-15.PDF>
- [14] Jobs for the Future (JFF). “Work-based learning glossary.” Accessed: April 1, 2024. [Online.] Available: <https://www.jff.org/idea/work-based-learning-glossary/>
- [15] J. Giffin, G. Neloms, A. Mitchell, D. Blumenthal. “Work-based learning definitions: Themes from states and national organizations,” American Institute For Research, January 2018. Accessed: April 1, 2024. [Online.] Available: https://ccrcenter.org/sites/default/files/WorkBasedLearning_StateDefinitions.pdf
- [16] O. Rice, J. Hudson, L.R. Foster, and S. Klein. “Connecting secondary career and technical education and registered apprenticeships: A profile of six state systems,” Office of Career, Technical, and Adult Education, US Department of Education, Jul. 2016. Accessed: April 1, 2024. [Online.] Available: <https://eric.ed.gov/?id=ED571820>



- [17] J.W. Creswell and V.L. P. Clark, *Designing and conducting mixed methods research*, 3rd ed. Los Angeles, CA, USA: Sage Publications, 2018.
- [18] M.Q. Patton, *Qualitative research & evaluation methods*, 4th ed. Thousand Oaks, CA, USA: Sage Publications, 2015.
- [19] J. Saldaña, *The coding manual for qualitative researchers*, 3rd ed. London, England: Sage Publications, 2016.
- [20] A.N. Fuller Hamilton. "Work-based learning programs: Providing experimental learning opportunities for all students," Pathways Resource Center, University of Illinois, March 2015. Accessed: April 1, 2024. [Online.] Available: <https://occril.illinois.edu/docs/librariesprovider2/prc/work-based-learning.pdf>
- [21] M. Mean and G. C. Gonzalez. "How work-based learning can bring employers and students together." RAND, July 24, 2019. Accessed: April 1, 2024. [Online.] Available: <https://www.rand.org/blog/2019/07/how-work-based-learning-can-bring-employers-and-students.html>
- [22] National Science Foundation. "NSF 21-598: Advanced Technological Education (ATE): Program solicitation," July 12, 2021. Accessed: April 1, 2024. [Online.] Available: <https://www.nsf.gov/pubs/2021/nsf21598/nsf21598.htm>