White Paper: Creating Assessments for Micro-Credentials in Higher Education Organizations

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EXECUTIVE SUMMARY

This whitepaper presents a comprehensive process for assessing the value of micro-credentials in higher education, addressing a critical need for standardized evaluation methods that reflect their impact and effectiveness.

Micro-credentials represent a significant opportunity for institutions to recognize and validate smaller-scale learning experiences that contribute to student success but often go unrecognized. They can provide a more nuanced understanding of an individual's skills and knowledge, helping to recognize more learning outcomes and better match employees with jobs. However, the impact and effectiveness of micro-credentials in higher education is not well-understood since there are currently no standardized methods of measuring their success. The issues with creating standardized assessments for micro-credentials include the immense variety in their design, their short duration and size of learning, and the difficulty of separating their impact from other factors. Additionally, the typical challenges of creating any type of credential also apply to micro-credentials, including ensuring credibility, reliability, and clarity in terms of the learner's accomplishments.

To address these challenges, this whitepaper provides a detailed framework for evaluating micro-credentials, helping higher education institutions understand the return on investment, demonstrate value to stakeholders, determine optimal placement, and validate their claims about micro-credential outcomes.

The framework was developed using an information systems design approach, recognizing that all education credentials, including micro-credentials, function as information systems. When an individual earns a credential, they are effectively generating information about their acquired knowledge and skills, which is then distributed to others. The issuing body creates and validates this information, while stakeholders such as employers and admissions departments collect, process, and act on it. This framework is designed to analyze and evaluate the effectiveness of micro-credentials in terms of meeting the needs of these three key stakeholders– earners, issuers, and viewers.

EXECUTIVE SUMMARY, CONTINUED

The framework systematically evaluates micro-credentials in relation to these stakeholders, across three types of value:

Perceived Value:
The investment stakeholders are willing to make in using the credential.

Revealed Value:
The measurable real-world benefits the credential provides.

Normative Value:
The potential maximum benefit the credential could offer.

This approach ensures that micro-credentials are systematically assessed for their input (Perceived Value), output (Revealed Value), and potential (Normative Value), much like how an information system would be evaluated in a structured and holistic manner. **To allow for relative comparison between micro-credentials, these values can be organized into measures of Time and Money**—such as the perceived monetary value of a micro-credential or the amount of time someone would spend to earn a micro-credential.

Presented as a step-by-step process, this framework is designed to be adaptable yet systematic. The process begins with identifying the relevant stakeholders and determining the type of value to assess, followed by establishing goals, standards, or benchmarks, and designing appropriate measurement instruments. Finally, the framework provides strategies for overcoming common assessment challenges and encourages iterative evaluation to ensure continued relevance and accuracy.

To illustrate the practical application of this framework, this whitepaper includes a narrative example of an assessment process for a micro-credential aimed at increasing student engagement in STEM activities. This example demonstrates how the framework can guide the creation of assessments that align micro-credential offerings with the institution's educational and strategic goals.

The assessment framework presented in this whitepaper can be applied by any institution looking to maximize the potential of micro-credentials. This approach is adaptable to the unique characteristics of each micro-credential, ensuring that assessments remain comparable across different credentials while also aligned with specific institutional goals. By applying this framework, institutions can enhance the credibility and reliability of micro-credentials, improve alignment with institutional goals, make informed programmatic decisions, and ensure they are contributing to student success and career readiness.

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INTRODUCTION

Micro-credentials provide institutions of higher education with an opportunity to expand the ways in which learners can benefit from the amassed knowledge. More specifically, institutions of higher education can use micro-credentials and accompanying Digital Badges to issue assessments for learning that should not be subjected to the Carnegie Unit model. For example, many smaller-scale learning experiences that happen frequently in college receive no recognition but are often critical to success in the workforce. It does not make sense to give these experiences grades, but it does make sense to give these experiences more recognition than they currently receive. An equally compelling reason to issue micro-credentials is to provide higher education stakeholders (i.e., students, educators, employers) a more nuanced understanding of someone's skills and knowledge. Micro-credentials, in combination with traditional credentials, can provide a more detailed summary of an individual's mastery, and thus make it easier to match employee with employment, or know where someone either excels or has a deficit of knowledge. Considering that the goal of higher education is to help students develop the knowledge and skills that they need to be successful in their personal and professional lives, it makes sense that many higher education organizations who have progressive administrators and faculty are leading by example, issuing micro-credentials and recognizing student accomplishment.

However, the success of micro-credentials is often a case of promise before proof. Currently, there are no standardized methods of measuring success of micro-credentials in higher education. This is not hyperbole - there are not even basic measures that a higher education organization can use to evaluate and compare their different micro-credential implementations (Hickey & Chartrand, 2020) – and with good reason! The issues with creating standardized assessments for micro-credentials include:

- Lack of common definition: this makes an assessment difficult to reuse between organizations since both may have significant differences in what they create as a micro-credential.
- Short duration/size: the relatively small size of a micro-credential, compared to other education delivery (e.g., a single course, a series of courses, an extended experience) makes it challenging to prove that an individual micro-credential has had a significant impact on a learning outcome.
- Natural context: because of the size of micro-credentials (i.e., a relatively small learning experience), there is more likelihood that a micro-credential's impact is mitigated by other factors. There, the impact of a micro-credential is difficult to separate from other influences. For example, it is naturally challenging to determine, when someone with a micro-credential is hired, what percentage of their success is due to the micro-credential.

- Diverse learning outcomes: micro-credentials can be implemented for any type of learning goal, which means that any assessment of a micro-credential has to be adaptable to any type of content.

The aforementioned issues of creating a standardized assessment of micro-credentials must also be considered with the standard challenges of creating any type of assessment:

- **Integrity:** a credential is only as valuable as the faith in the institution that issued the credential, and this is notoriously difficult to assess since it requires understanding the reputation of the issuing institution, which is not often quantifiable.
- **Reliability:** credentials must be consistent in what they represent and for what they are issued. If a credential is perceived to be unreliable, it engenders suspicion on all credential holders.
- **Actionable Results:** a credential is designed to accomplish a specific goal, and it is necessary to evaluate a credential based on whether it accomplished that goal.
- **Non-academic outcomes:** A credential represents more than an academic accomplishment, but it is often unclear what those non-academic accomplishments are.

But despite this, there is an incredible need for creating assessments of micro-credentials.

- **Return on Investment:** Higher education institutions are investing heavily in micro-credentials, based on perceived and theorized value. But these investments can only continue for a relatively short period until it becomes necessary to understand what the return on investment for the micro-credential is. Higher education organizations need a way to quantify the return on value of a micro-credential.
- **Value to Stakeholders**: Even if a micro-credential is accomplishing a goal for one set of stakeholders, if it does not have perceived value to other stakeholders then it will likely be unsuccessful since there is no motivation to have all stakeholders adopt the micro-credential. So successful micro-credentials need a way to measure stakeholder interest and motivation.
- **Optimal Placement:** Because micro-credentials are a novel educational reform, it is still unclear where a micro-credential is optimally placed. In other words, a micro-credential may be optimally designed, with stakeholder buy-in, but may be misapplied and in competition with already functional credentials. Micro-credential creators need a way to determine if there is a market for micro-credentials in a specific context before investing resources.
- **Validity of Claims:** The higher-education organizations that have invested in micro-credentials need to be able to prove to their own stakeholders that they have accomplished their intended goals related to micro-credentials.

CREATING AN ASSESSMENT FOR AN INFORMATION SYSTEM

Information systems enable the collection, organization, storage, and communication of information. A singular information system often functions as a group of complementary networks that people and organizations use to collect, process, validate, create, and share data. Depending on the complexity and importance of the information, a system can encompass a combination of technology, infrastructure, and personnel who organize, plan, control, coordinate, and protect the information.

Credentials also function as information systems. An individual earns a credential so they can distribute information about what they have learned to others. The issuer of the credential is creating and validating information related to what they prioritize (i.e., the information they decide should be credentialed). Other stakeholders, like employers or admissions departments, collect and process the information to facilitate their decisions. For example, the information in a college degree, perhaps the most valuable type of credential widely available, is created by a university or college to validate that an individual has successfully completed enough learning to both have a general level of knowledge and mastery over a particular domain. The graduate then references the degree on their resume in order to share the validation with others. A potential employer collects the information about who has earned different degrees so they can then process who best fits the position they wish to fill.

Consequently, we can evaluate Credentials regarding their effectiveness and value as information systems. We may examine a credential to determine its perceived value (i.e., how much someone is willing to invest to receive a credential), revealed value (i.e., how much a person benefits from receiving the credential), or normative value (i.e., what is the potential, maximum benefit of the credential). For example, the perceived value of a college degree is how much money a student is willing to pay and how much time they are willing to spend to receive the degree. The revealed value of a college degree is how much a recipient directly benefits from receiving the degree, such as whether the degree led to employment or allowed access to an alumni network. The normative value of a college degree is how much it benefits the recipient over time such as a percentage increase in lifetime income over non-college degree earners, or increase in societal status (i.e., reputation boosting).

Choosing which type of value is most meaningful to evaluate or assess an information system is often a decision that is reflective of the priorities of the evaluator. For a college degree, a student evaluating whether to apply to a university may look at the cost of the degree (i.e., perceived

value) and compare that to college tuition at another institution (i.e., another perceived value) or their belief in how the degree will benefit them (i.e., combining the revealed value and the normative value). A university administration may compare how their graduates perform on the job market to another university or whether there is an increase in performance over time (i.e., comparing one revealed value to another).

So, a micro-credential ecosystem, just like any type of credential, is also an information system, and can be assessed for perceived, revealed, or normative value. But because micro-credentials function at such different scales than traditional credentials, even when compared to smaller credentials like certificates, the measurement and prioritization of these values requires new approaches than what is used for traditional credentials.

For determining the value of a micro-credential system, we need to first decide who are the stakeholders who are the determiners of micro-credential value, what types of values do they prioritize, and how the values are going to be determined. These determinants will vary depending on the context of the assessment. In other words, each assessment for each micro-credential will be constructed according to the unique aspects of that micro-credential. This means that an assessment for one micro-credential cannot be necessarily used for another without modification. But the results of the assessment (i.e., the ratio or score being generated) is directly comparable to another micro-credential.

DETERMINING THE STAKEHOLDERS

The first step in creating an assessment of a micro-credential is to **determine who are the stakeholders** that will be making critical decisions necessary for creating or completing the finished assessment (Tucker et al., 2012). The stakeholders of a micro-credential system are commonly the micro-credential issuer, the earner of the micro-credential, and those that use the micro-credential (e.g., the earner, a future employer, a university) (Devedžić & Jovanović, 2015). For a higher education organization, the issuer of the micro-credential is almost always the university itself. Similarly, students are often the earner of a micro-credential (Stuart, Rios-Aguilar, & Deil-Amen, 2014)., although these students can be undergraduates, graduate students, continuing education attendees, etc. Typical viewers of the micro-credential can be an employer who is hiring based on the micro-credential.

We note that an organization may not have previously determined what values they care about regarding micro-credentials. Because there are many ways to consider the value of a micro-credential, the creators of the micro-credential may not have designed or implemented with a particular value as prime. This could be because they were hoping for multiple benefits from the micro-credential implementation or because they were just testing how to implement micro-credentials without focusing on a specific end goal – all legitimate approaches since one of the

key benefits of micro-credentials is rapid creation and iteration.

If a higher education organization does indeed consider itself a determiner of the value of a micro-credential, then the next task is to determine if they should also consider whether other stakeholders should be determiners of value. A quick consideration of this issue may suggest that all other stakeholders should always be considered, but this would be a mistaken assumption (Deming et al., 2016). For example, a university may not want to consider employers' valuation of its degrees if it is worried about creating new degrees for an emerging job market that current employers perceive as competition or if they are infusing their degrees with content based on social considerations that an employer may not immediately value (e.g., liberal arts knowledge, EDJI). Or students may not fully understand what micro-credentials are, so asking them about what they value for a micro-credential would be unfruitful (Jobe, 2014). Just as with traditional credentials, there are situations where other stakeholders' values should only be considered at a later point or possibly not at all.

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STEP 1 ACTIONS

Pick which Stakeholders should be considered when creating the Assessment (at least one is needed but any or all may be included).

a. Issuers of the micro-credential (typically the Higher Education Organization).
b. Earners of the micro-credential (typically a student who has earned the credential).
c. Viewers of the micro-credential (typically an employer, but can be a peer or educator).

2 DETERMINING THE VALUES

The second, but perhaps the most challenging aspect of creating an assessment for a micro-credential, is **determining what are the values by which the credential should be assessed.** There is essentially an unlimited number of determiners by which a micro-credential could be valued (Higashi & Schunn, 2020); from the superficial but still impactful (e.g., how the micro-credential looks, where it can be seen) to the inherent but almost impossible to measure (e.g., how a micro-credential can make someone feel, its long-term impact on finances).

Because all micro-credential systems are designed for a particular set of stakeholders in a specific context, we cannot claim that there is any one correct way to decide on a set of values for micro-credentials. Or to state it in a positive manner, if a micro-credential is accomplishing what its designers want it to do, then it is inarguably successful. But we can offer clear, straightforward ways to determine which values might be chosen for a micro-credential system that align with the intention of the micro-credential designers and implementors.

Based on our experiences assessing micro-credential offerings and systems, we suggest that almost all micro-credential values can be interpreted based on the categories of values within an Information System (Ahituv, 1980). First, there is Perceived Value, which is the value that someone is willing to exercise or 'pay' in order to receive or use the micro-credential. There is the Revealed Value, which is the measurable real-world benefit from the micro-credential. Finally, there is the Normative Value, which is the hoped-for, maximum benefit of the micro-credential. All three of these categories of values have both advantages and disadvantages for assessment of micro-credentials.

Perceived Value is useful for understanding just how much different stakeholders are willing to invest in the use of a micro-credential, which can then lead to identifying which stakeholders need more convincing as well as designing micro-credentials that entice or attract users. These are critical aspects of micro-credential development, since their success depends entirely on stakeholders' willingness to adopt and use them. A micro-credential that has low perceived value will never be successful, no matter how much actual value it may offer. However, Perceived Value is also subjective and can change rapidly, since it is based on human perception.

Tips To Consider when Deciding to Assess Perceived Value:

- Perceived Value can be assessed for both established micro-credentials (i.e., those with a cohort of earners) and prospective micro-credentials (i.e., those in which the organization is considering developing or which have not yet been issued).
- Stakeholders do not need to have earned or used a micro-credential to participate in this type of assessment (e.g., employers who have not yet considered micro-credentials in their hiring practices).
- An Assessment of Perceived Value is a great choice when the stakeholders want to assess potential interest or demand.

Revealed Value is useful for understanding what the actual impact of a micro-credential has been, which is critical for determining ROI or addressing critics of micro-credentials. Many decisions on how to allocate resources in higher education organizations need to eventually be based on empirical evidence that the investment has returned more value than it cost. The way to determine this with micro-credentials is to measure a real-world benefit to a stakeholder. Once the benefit is measured, it can be used for determining what is a reasonable future investment or to directly answer critics who might be arguing that there is no or little value to the credential. However, Revealed Values for micro-credentials are often very challenging to measure since the impact of a micro-credential can vary widely and may have a delayed or indirect impact.

Tips To Consider when Deciding to Assess Revealed Value:

- Revealed Value can only be assessed for established micro-credentials (i.e., those with a cohort of earners), since it is based on what has happened.
- Stakeholders must have earned or used a micro-credential to participate in this type of assessment (e.g., employers who are using micro-credential in their hiring practice).
- An Assessment of Revealed Value is a great choice when the stakeholders want to assess what are impacts of a micro-credential.

Normative Value is useful when designing a micro-credential to have it largest, positive impact. Simply put, the only way for a micro-credential to have its maximum value is if it is intentionally designed to have that value. Because micro-credentials operate in the real-world, with its unlimited covariates and influences, there are always factors that may harm their impact or artificially boost their value (e.g., a global pandemic, a fad). Consequently, the Normative Value of a micro-credential is the only 'fair' way to determine what it can do for stakeholders. Of course, Normative Value is an ideal value and will likely only be rarely achieved in normal micro-credential use, however, understanding where a micro-credential stands in relation to its normative value can be crucial for identifying areas for improvement and measuring progress towards the ideal.

Tips To Consider when Deciding to Assess Normative Value:

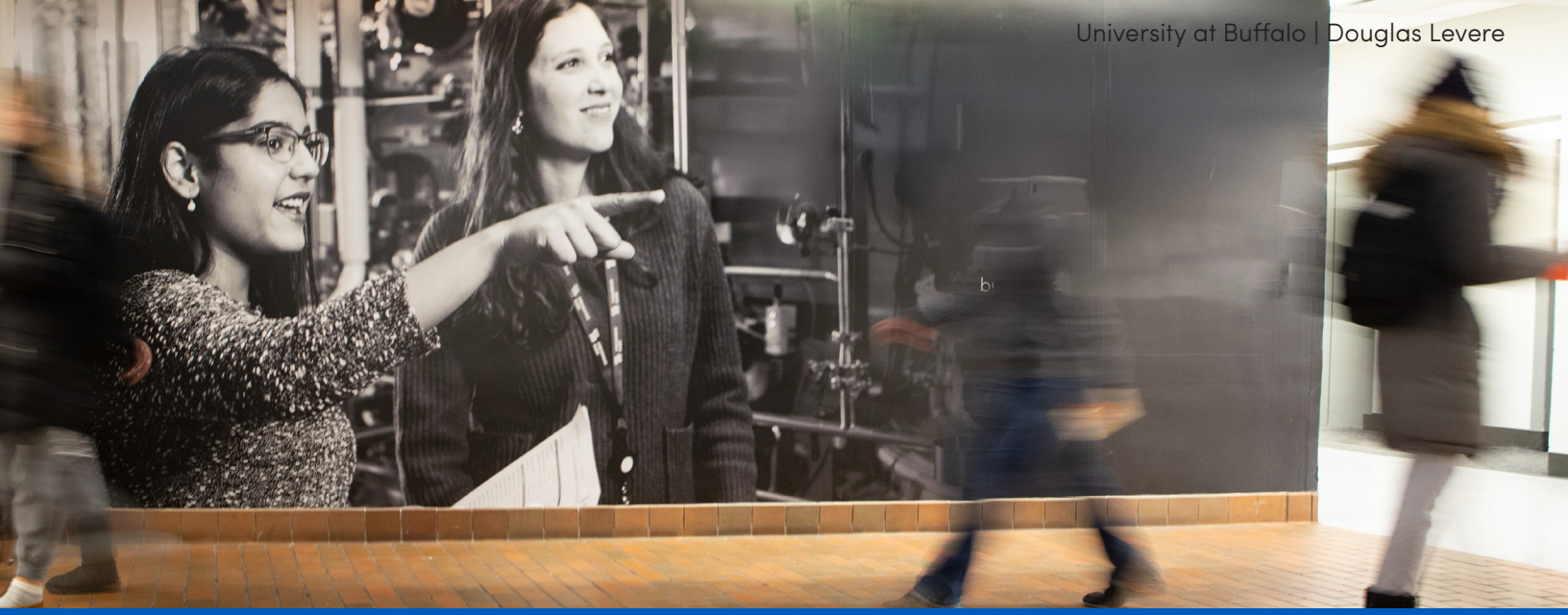
- Normative Value can be used throughout the design and post-implementation for micro-credentials (i.e., both the micro-credentials that are being designed and those with a cohort of earners), since it is used to determined what is the maximal value of the micro-credential.
- All Stakeholders for the micro-credential should be consulted when determining Normative value since it will require all stakeholders to value the micro-credential for the normative value to be achieved.
- An Assessment of Normative Value is a great choice when the full potential of the micro-credential will help in making decisions.

While categorizing the desired values of a micro-credential into Perceived, Revealed, and Normative values is a necessary first step, an assessor must still determine the descriptor or unit by which those values are measured. Again, there is an infinite number of units that can be selected, but we would recommend picking units of measurement that offer cross compatibility between different micro-credentials, different assessments, and different organizations. If the assessment for a micro-credential relies on surveys or interviews, those measures are completely situated to the setting where they are designed to be used, and cannot be used for relative comparisons without complex, qualitative methods that require research expertise.

Therefore, we recommend units of measurement that can be applied to different values but also offer comparative value: Financial Cost and Time. Financial Cost is a universal way to measure the value of something (Macher & Richman, 2008). How much someone is willing to pay for something is a direct reflection on how much they value it. The cost of something is a recognizable way to measure Perceived Value (e.g., what would you pay for this micro-credential?), but is also a recognizable way to measure Revealed Value (e.g., how much more money did you make because of the micro-credential?) and Normative Value (e.g., how much more money will you make because of the micro-credential?). But Financial Cost cannot measure the value of a micro-credential as reflected by concepts like effort, excitement, and motivation; and those concepts are ways by which we do value credentials (e.g., are people willing to work hard for a micro-credential?; are people motivated to earn a micro-credential?). However, Time is an excellent way to measure how much a stakeholder values something since their willingness to invest their time in it can function as a proxy for their valuation (Juster, Ono, & Stafford, 2003). The amount of time someone is willing to spend to earn a micro-credential can reveal if they are motivated to earn it, or how much they want the micro-credential independent of their financial means.

So, in summary, we suggest that the assessors of a micro-credential, using feedback from the stakeholder, first determine what types of values they want to know (Perceived, Revealed, and Normative) and how they will describe those values (Financial Cost or Time). Once their values and descriptors are determined, they can then determine the equivalent values and descriptors for other stakeholders.

Here we provide an outline with different values and units that can be used to build an assessment of a micro-credential. For each type of value, we suggest ways that it could be determined for different stakeholders using different units of measurement. We again note that we do not suggest any one type of value or measure is more important than another, but the correct values and measures are those that either reflect the purpose of the micro-credential or the values of the organization who is assessing the micro-credential. This is also not an exhaustive list; if a micro-credential is designed to lead to a specific activity (as we illustrate in our example in this whitepaper) then that may take precedence over values directly related to the micro-credential. But even in that case, the following values and units can be readily adapted to that targeted goal.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CATEGORIES OF MICRO-CREDENTIAL VALUES

1. **Perceived Value** – how much someone is willing to invest or pay for a micro-credential.
    a. Earner (i.e., Student)
        i. Financial Cost –the amount someone would pay for the micro-credential.
        ii. Time – the amount of time someone would be willing to spend.
            1. To earn the micro-credential.
            2. To display or communicate using the micro-credential.

    b. Issuer (i.e., University)
        i. Financial Cost –the amount of financial resources that the organization is willing to spend to create and administer the micro-credential.
            1. Financial costs of creating and administering an individual micro-credential.
            2. Financial costs of creating and administering a micro-credential system.
        ii. Time – the amount of time that the organization is willing to spend to create and administer a micro-credential.
            1. Time to learn/train others to create the micro-credential.
            2. Time to create the micro-credential.
            3. Time to provide the associated learning experience and issue the micro-credential.
            4. Time to maintain the micro-credential and its system.

    c. Viewer (e.g., Employer, Educator, Peer)
        i. Financial Cost –the amount of financial resources the Viewer is willing to spend to be able to use the micro-credential.
            1. Adapting hiring processes to use the micro-credential.
            2. Paying to access a micro-credential.
        ii. Time – the amount of time that the Viewer is willing to spend to parse or use

the micro-credential in decision making.

1. HR/Hiring Individual interpreting and validating the micro-credential.
2. Spending time to understand or interpret what the micro-credential means.

2. **Revealed Value** – how much was improved by the micro-credential.
    a. Earner (i.e., Student) Benefit
        i. Financial Benefit –Salary of Job that someone attributes to being hired because of micro-credential.
        ii. Time – amount of time that the micro-credential generates or reduces in a job search (e.g., reduced time out-of-work, frequency of job interviews).

    b. Issuer (i.e., University) Benefit
        i. Financial Cost –the amount of revenue generated by a micro-credential.
            1. Revenue directly from the micro-credential.
                a. Enrollment Hours or Tuition.
                b. Issuing Cost or Transcription Fees.
            2. Associated Revenue from micro-credential pursuit.
                a. Student Enrollment in other programs.
                    i. Continuance at the University.
                    ii. New Program Enrollment.
                b. Alumni Giving.
        ii. Earner Time (as a proxy for Engagement, Motivation, or Interest)
            1. Time spent engaged in micro-credential pursuit.
            2. Time spent engaged in other University activities based on a micro-credential.
            3. Time spent advocating for the University.
                a. Advocating for the micro-credential program.
                b. Advocating for the University because of the micro-credential.

    c. Viewer (e.g., Employer, Educator, Peer)
        i. Financial Benefit
            1. Revenue generated from hiring micro-credential recipients.
            2. Reduced cost for finding potential hires.
            3. Reduced costs of in-house training/professional development of current employees.
        ii. Time
            1. Reduced training time of new hires because of skills learned through the micro-credential.
            2. Reduced time identifying potential hires because the micro-credential

improved the process.

3. Reduced time vetting applicants because of the details provided in the digital badge (e.g., verified issuer; explicit skill descriptors; evidence of competencies).

3. **Normative Value** – the potential, maximal value of the micro-credential.
    a. Earner (i.e., Student) Benefit
        i. Financial Benefit –Total Increase in student earnings.
            1. Over a Defined Time Period.
            2. Lifetime.
        ii. Time – Total amount of job offers for student because of the micro-credential.
            1. Over a Defined Time Period.
            2. Lifetime.

    b. Issuer (i.e., University) Benefit
        i. Financial - total revenue generated by a micro-credential.
            1. Direct Revenue over a Defined Time Period.
                a. Total Enrollment Hours or Tuition.
                b. Total Issuing Cost or Transcription Fees Generated.
            2. Indirect Revenue over a Defined Time Period.
                a. Total Student Enrollment in other programs.
                    i. Continuance at the University.
                    ii. New Program Enrollment.
                b. Total Alumni Giving.
        ii. Earner Time (as a proxy for Engagement, Motivation, or Interest)
            1. Total Time spent engaged in a micro-credential program.
            2. Total Time spent engaged in other University activities based on micro-credential.
            3. Total Time spent advocating for the University.
                a. Advocating for the micro-credential program.
                    i. Defined Time Period.
                    ii. Lifetime.
                b. Advocating for the University in General.
                    i. Defined Time Period.
                    ii. Lifetime.

c. Viewer (e.g., Employer, Educator, Peer)
    i. Financial Benefit
        1. Total Revenue generated from hiring micro-credential recipients.
            a. Defined Time Period.
            b. Lifetime.
        2. Total Reduced cost for finding potential hires.
            a. Defined Time Period.
            b. Lifetime.
    ii. Time
        1. Total Reduced training time of new hires.
        2. Total Reduced time finding potential hires.
        3. Total Reduced time vetting applicants.

STEP 2 ACTIONS

1. Identify the stakeholders that will be considered in your assessment (issuer, earner, and viewer.
2. Determine the value type that will be assessed in relation to each stakeholder (Perceived Value, Revealed Value, or Normative Value).
3. Using the outline above as a guide, identify the specific units of financial costs and time measurements that will be collected and analyzed.

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3 CREATING A RATIO OF GOALS, STANDARDS, OR BENCHMARKS FOR THE MICRO-CREDENTIAL

Once stakeholders and their respective values (including units of measurement) for the micro-credential have been identified, then it is necessary to **choose what are the standards, goals, or benchmarks** that the micro-credential assessment will address. Or in other words, the next step is to decide what are the targeted values that the assessor wants to know. Without this critical step, there is little value in creating an Assessment for a micro-credential since it would be just testing for the sake of testing. Testing just for a desire to have data can actually hurt a micro-credential implementation since the assessment could supersede or distract from the true objective of the micro-credential. Instead, identification of a standard, goal, or benchmark that is associated with the purpose of the micro-credential is critical to ensuring that the assessment provides meaningful information.

Perhaps the easiest, simplest benchmark is to identify how the micro-credential is currently performing. This would likely manifest in using an assessment that gathers current performance data on the stakeholder values that are of primary importance to the assessor. But an assessment that just measures current performance lacks any relative comparison that will allow for meaningful conclusions. For example, a micro-credential could be assessed to determine its popularity, but it will be unclear if that popularity is high, low, or normal without something to compare it to. Additional measurements can be taken later, but other than just showing that the micro-credential's relative appeal may have changed over time, it does not offer any immediate conclusions.

The creation of a standard, goal, or benchmark for an assessment does not preclude the eventual use of the data for a Pre-Post comparison, where the goal is to just see what was the impact of the micro-credential over time. Assessments of current performance can also be used to 'rank' micro-credentials, comparing their performance. But again, these assessment goals do not offer immediate, actionable direction. Consequently, we encourage even novice micro-credential assessors to pin some type of expect value for the assessment.

To ensure a meaningful assessment, we suggest creating a ratio based on what are the stakeholder values for the micro-credential. The first value should be the targeted goal for the micro-credential (i.e., the desired outcome driving why the micro-credential was created). The second value in the ratio is an appropriate, relative value that informs how close the micro-credential is to achieving the first value. So, for example, if the first value is a number of hours that a university would like a student to spend earning the micro-credential, then the second value could be the actual number of hours spent earning the micro-credential. Alternately, the second value could be the amount of time a student would estimate spending on earning the micro-credential. Or the ratio could include all three numbers to provide a more complete assessment of the micro-credential. The closer the ration is to the value of 1 (i.e., 2 or more value that are

equal) then the more the micro-credential is completing its intended purpose. Or to consider it another way, the ratio would allow for a percentage number to be generated to allow university decisionmakers to process a summarized assessment of their micro-credential offerings.

But most meaningfully, the ratio should allow for direct action based on the determined values. If the ratio is not an expected value, then the micro-credential issuers can change the design or implementation of the micro-credential, reassess, and generate a new ratio, and then directly compare the prior ratio with the current value. This will then tell the assessor how effective their change is based on the change in value of the ratio. To continue the prior example, if the number of hours that a student would estimate spending on the micro-credential is far less than what the university is expecting, then that suggests the micro-credential should be modified immediately, independent of how it would perform over time.

STEP 3 ACTIONS

1. Develop an initial ratio that when implemented would generate meaningful conclusions (e.g., actionable suggestions, inform stakeholders).
2. Determine if the ratio would have value when used for relative comparisons between micro-credentials. Make adjustments to ensure meaningful connections.
3. Prepare to readjust the ratio as needed, as well as communicate the meaning of the ratio and how it should be interpreted (e.g., change the variable as the micro-credential matures, make sure that a 'passing' percentage is understood).

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4 DESIGNING THE MEASUREMENT INSTRUMENTS

Because the process of creating a micro-credential assessment involves picking stakeholders, then values, and then units of measurement, the result is that the instruments that gather the data for the assessment may look considerably different from each other. Even with our suggestion to restrict units of measurement to either time or money, the number of potential variations in the assessment mean that there is no one universal instrument for collecting the relevant data. However, we do believe that the following, suggested instruments can provide a strong foundation for designing your own measurement instrument. But it is very valuable that each measure is piloted before being implemented at scale. This is necessary since word choice and explanations in a question can both impact accuracy and will be different based on the population being surveyed. For example, the interpretation of the term 'academic work' may mean studying to one student, but time spent in class to another student. It's also possible that if the purpose of the measurement is to just create a baseline, then it isn't necessary to make sure there is universal agreement for the measure since it is likely that later measurements of the population will result in the same interpretation of the instrument.

Also, if a large amount of data is possible to collect then regression to the mean is more likely; also lessening the impact of different interpretations. For all the aforementioned reasons, it is helpful to pilot a measurement and is worth doing so if there are resources that can be allocated for it.

Ways to Measure Time:

1. Ask how much time someone would spend on earning a micro-credential. This is a stylized measure of time, which may not be technically accurate but is replicable – which means that the respondent will consistently provide the same answer – which is valuable for measuring change over time. For example:
    a. How many hours per week do you USUALLY spend for academic work?
    *By academic work, we mean the main academic goal for you (e.g., earning a degree, getting certified, training).
    **Please provide an answer in Hours.
    b. How many hours per week do you USUALLY spend at your main job?
    *By job, we mean the main one you do to earn money.
    **Please provide an answer in Hours.
    c. How many hours per week do you USUALLY spend for other activities?
    *By other activities, we mean things you do that could not be classified as academic or work (e.g., fun, volunteering, family time) but do not include sleep.
    **Please provide an answer in Hours.
    d. How many hours per week would you spend earning this micro-credential?
    **Please provide an answer in Hours.

2. Ask someone what activities they spend time on (e.g., a Time Diary). The value in this approach is that it still maintains replicability inherent of stylized measure but allows for more detail given variability in certain activities. It also allows for ranking activities which then can be used for relative comparison, acknowledging that time is not a final measure of importance. For example,
    a. Ask for a list of the activities that a person spends time doing. This list of activities can be comprehensive (i.e., all the work for an entire day) or limited to a category or focus (e.g., all the work you do at school for an entire day, time spent in extracurricular activities). In addition, this list can also be for different time scales (e.g., day, week, semester), although the longer the timescale then the more narrow the focus of the list should be (e.g., all the activities for a day, all studying activities for a week, all the activities spent in club sports for a month).
    b. Request time estimates for each listed activity.
    c. Ask for a time estimate for the targeted micro-credential.
    d. Rank all activities to better understand student priority.
    *Please rank all activities once based on time and then based on importance to you.

3. Use programmatic time tracking (i.e., time data automatically generated within an application or system). This is only possible if there is technology associated with the micro-credential that can track timing, but provides a high level of accuracy from consistent measurement reliability provided by technology. Possible time measurements include the following, noting that multiple types of time measurements can be used to verify or validate reliability:
    a. Individual measurement of time spent. For example, if a micro-credential is earned through an online learning platform, then the same platform could be used to track an individual's time spent earning the micro-credential. This can then be used to create individual assessment ratios.
    b. Time spent engaging in a micro-credential experience in aggregate (across all participants); taking the total amount of time and dividing by the number of micro-credential earners. This average time is valuable for comparing average times that are already known, allowing for comparisons to average time spent for students in a related or competing activity (e.g., comparing time spent on a micro-credential to an unrelated co-curricular activity, comparing time spent on a micro-credential to another average time spent on a different micro-credential).
    c. Use a proxy time measurement; either time spent in a part of a micro-credential system, or a system related to the micro-credential. If it is impossible or impractical to measure time spent on a micro-credential then a proxy measure of time could be used as long as it is understood that a proxy measure carries an additional level of uncertainty, and that it is more useful for relative comparison than direct. For example, If the micro-credential system can only track the amount of time spent

completing part of the micro-credential then it may be reasonable to believe that more time spent on that part of the micro-credential correlates with total time.

Tips to Consider when Deciding How to Measure Time:

Consult stakeholders when selecting time measurements to determine if the measurement will be interpreted as relevant to the corresponding value being assessed.

- Verify that the chosen instrument will generate reliable measures by piloting it.
- Note that the instrument should be reliable but does not need to generate 'valid' or 'true' data. Estimates of time are often skewed, but even with some bias can still inform an assessment for a micro-credential.

Ways to Measure Cost:

There are a number of ways that could be used to measure an individual's valuation of a micro-credential, with some measures being fast and others being more sensitive to context and sensitivity to fluctuation. Choosing a particular method will likely depend on resources available, prior knowledge about cost, and then the necessary level of accuracy. It is also likely that a method for initial measurements can then be later switched to a faster measure that provides similar accuracy because of data generated from the earlier measurement.

Most importantly, remember that the cost being measured is a way to measure a level of importance and not being used directly for price determination. Or in other words, how an individual answers cost related questions does establish the true valuation of a micro-credential (e.g., what someone says they would pay for a micro-credential is not always what they would pay in reality). Instead, cost is a proxy of valuation, so the best measurement tool is one that produces reliable measures (i.e., similar estimates of cost) rather than valid or true estimates of a financial commitment.

1. Direct Questioning - ask how much money someone would spend in order to earn the micro-credential (e.g., how much would you pay for this micro-credential?). The advantage of this approach is that it is fast to implement and analyze. However, some respondents might not be able to properly assess their own rationalization without further context.
    a. A follow-up question can be asked to explain how the individual determined the price (e.g., can you tell me how you chose that price?). This data could be analyzed but would require significant effort. However, independent of whether the answers to the follow-up question was analyzed, the question itself could prompt the respondent to reconsider their answer and provide a more accurate estimation – and in that case the respondent should be allowed to change their initial answer.
    b. Price ranges can be provided for the respondent to choose from (e.g., under a $100, $101 to $300, more than $300). The advantage of providing a price range is that it gives the respondent some normalized context for what a micro-credential

could cost. However, if the ranges are skewed positively or negatively (e.g., all respondents selecting under $100, all respondents selecting more than $300) then the measurement does not work.

   i. When determining initial ranges, these can be based on prior micro-credentials offered at the same or similar institution, an offering in a similar category to a micro-credential (e.g., tuition credit cost, club fees), or determined based on pilot data from direct questioning that did not include ranges.

c. Maximal financial value can be found using the Gabor-Granger Method – a method for finding the highest price that people would pay to earn a micro-credential. Respondents are asked if they would pay a random, but realistic, price for a micro-credential. If they answer that they would, they are then asked the same question again but with an increase in price. The process is repeated until they change their answer, with the last affirmative answer being their maximum price. The process also works inversely, if the first answer is that the respondent would not pay the prompted price for a micro-credential, then the price is lowered until they answer that they would spend that amount of money, establish the maximum value they would pay for the micro-credential. This process can also be altered depending on the process used for this method and the participating population. For example:

   i. Create a survey where respondents are asked a Likert-like intent question (Definitely Pay For, Probably Pay For, Maybe Pay For, Not Likely Pay For, Definitely Not Pay For) for a random price from a previously established price range. If the respondent answers in the top 2 choices - 'Definitely Buy' or 'Probably Buy' for this question, they are then asked the same question for a random price that is higher than was just asked. Repeat this until the answer is not in the top two and then the prior price is the maximum value.

   ii. This method can also be used to eliminate people who would not likely pay for a micro-credential by establishing a price floor (i.e., the lowest price offered in the survey). If a respondent immediately would not pay the price floor then they can be eliminated from the survey pool.

d. If university stakeholders are unclear as to what could even be a price range for their micro-credential, then the Van Westendor's Price Sensitivity Meter can be used – four questions that can be then used to create a range of realistic, monetary value.

   i. At what price would you consider the micro-credential to be so expensive that you would not consider getting it? (Too expensive).

   ii. At what price would you consider the micro-credential to be priced so low that you would feel the value wouldn't be very high? (Too cheap).

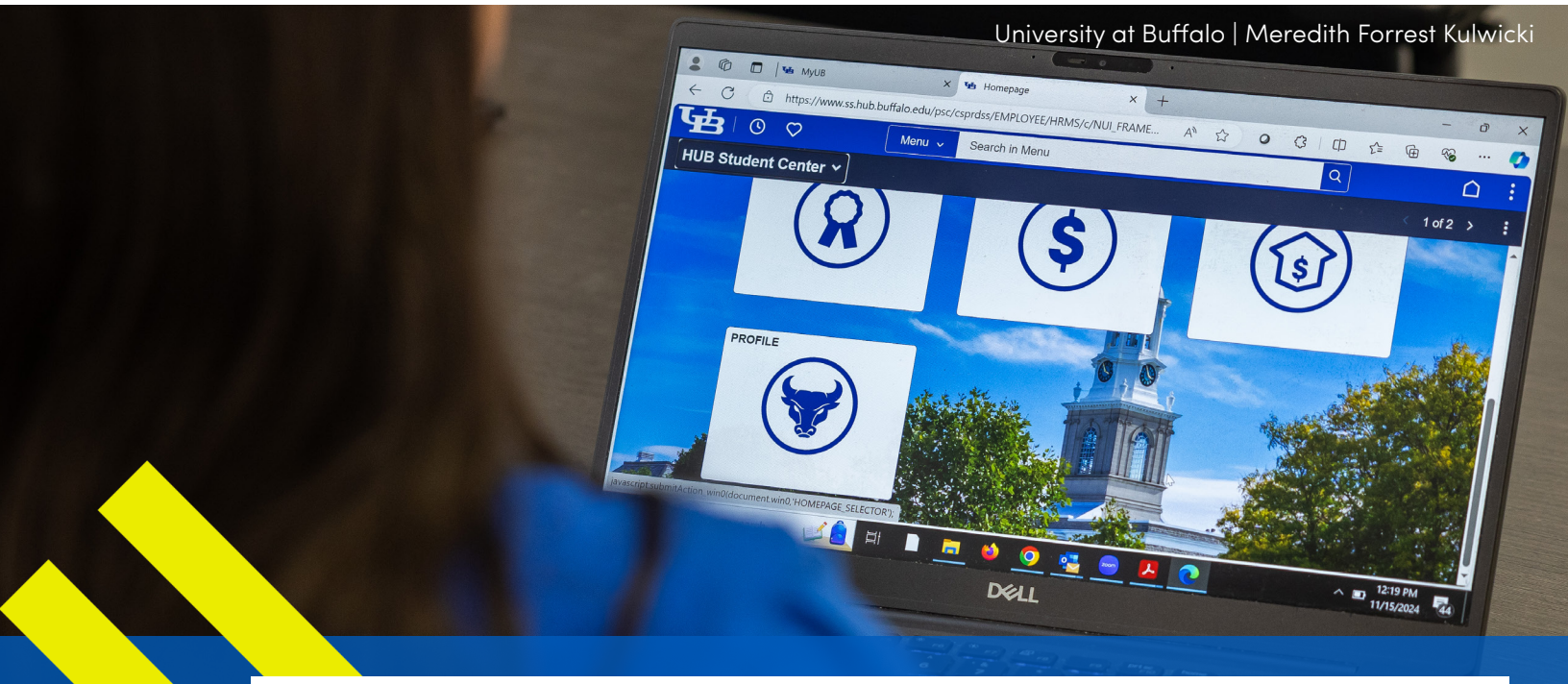
   iii. At what price would you consider the micro-credential beginning to be expensive, so that it is not out of the question, but you would have to give some thought before getting it? (Expensive/High Side).

iv. At what price would you consider the micro-credential to be a bargain—a great purchase for the money? (Cheap/Good Value).

2. Reference Pricing - ask someone what are similar activities they spend money on and then compare that to the micro-credential valuation. In this approach, people are still being asked directly what they would pay for a micro-credential but with the added context of how much they would pay for any educational product. This can then be either interpreted categorically (i.e., establish different categories of potential micro-credential earners depending on how much money they spend on education) or by relative comparison (i.e., considering where in the list of valued educational activities that micro-credentials rank). *There is not much value in referencing pricing for things that are perceived to be in different categories. For example, it is probably not valuable to ask if someone would rank food above or below a micro-credential.
    a. Get money estimates for each one; then get money estimate for the targeted micro-credential. This allows for the generation of actual financial information but can take a lot of time and may be subject to issues of accuracy (i.e., people may not remember what they actually paid for something).
    b. Ask someone to rank activities according to money spent; then rank the targeted micro-credential. This is relatively easy to accomplish but financial valuation between ranked items may be small or large and can skew measures of importance (e.g., textbooks may be ranked lower than a micro-credential but not by a significant amount of money).
    c. Typical Activities that can be provided to respondents, but should be altered based on what are known similar activities (e.g., adding a university specific opportunity, removing an activity not offered at your institution). We do not suggest that all of the following activities should be included in a survey.
        i. Tuition.
        ii. Textbooks and Course Materials that you are required to purchase.
        iii. Software not provided by the university.
        iv. Hardware (e.g., computer, phone).
        v. Subscriptions.
        vi. Tutoring.
        vii. Certifications.
        viii. Conferences, Seminars, or Workshops.
        ix. Fees for clubs, university societies, or sports teams – this should likely be split between each one (e.g., how much are your fees for your intramural sports activities?, how much do you spend on your drama club?).
        x. Networking Activities (e.g., attending a party for academic purposes, buying someone a cup of coffee to pick their brain).
        xi. Transportation.

xii. Printing.
xiii. Non-computer supplies (e.g., notebooks, pens, folders).

3. Programmatic money tracking (i.e., financial expenses tracked by a technical system) - This is only possible if there is technology associated with the micro-credential that can track costs associated with it (e.g., a university payment system that can report on what students paid for each micro-credential). Possible cost measurements include the following, noting that this is very often sensitive information and may not be readily available to assessors:
    a. Money spent engaging in Micro-credential experiences in aggregate (across all participants). This measure can then be compared to average money spent for students in a related/competing activity, such as those listed in relative price comparison.
    b. Money spent on a part of the micro-credential, or a system related to the micro-credential. This value would not represent the actual cost of the micro-credential but would act as a proxy measurement that would correlated with financial valuation of the micro-credential. For example, if there was a cost to retrieving or adding the micro-credential to a transcript then this could be a proxy measure of value.



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Tips To Consider when Deciding How to Measure Cost:

- Consult stakeholders when selecting cost measurements to determine if the measurement will be interpreted as relevant to the corresponding value being assessed.
- Verify that the chosen instrument will generate reliable measures by piloting it.
- Note that the instrument should be reliable but does not need to generate 'valid' or 'true' data. Estimates of cost are often skewed, but even with some bias can still inform an assessment for a micro-credential.

SOLVING CHALLENGES AND REPEATING THE ASSESSMENT

Addressing Potential Challenges Regarding Timing

The timeliness of the measures used in a micro-credential assessment will have an impact on their reliability and validity. For example, a measure of student perception of a micro-credential could vary based on when the measurement is made. A measure taken before the student understands the micro-credential may be inaccurate if it changes once the student develops their understanding. Or a measure taken a significant time after the student completes the micro-credential may be different than what the student perceives as they are completing the micro-credential. So it is important that the measurement timings (i.e., when the measurements are made) are chosen in order to maximize validity and reliability consistently.

To further address the challenge of timing, multiple measures can be used to create a mean measurement or rejecting a measurement that is skewed. For example, rather than relying on just one measure of student perception, the measure can be used at multiple timepoints (e.g., during the initial experience of the micro-credential, right after completing the micro-credential, several months after completing the micro-credential) and then a mean average can be used as a reliable measure of student perception. Alternately, if one measure of student perception is consistently uncorrelated with other more believable measures, then it can be removed from the assessment. Thus, it is also important to understand that multiple measures do not always equal better measures. Instead, a logical choice of timing for the assessment is better than just accumulating more data.

Addressing Potential Challenges Regarding Stakeholders

While some might want to make the identification of stakeholders as broad as possible, so that their micro-credential is widely accepted, this is a mistake in that it is unlikely that the micro-credential has that wide an appeal. Or to put it in other words, if the micro-credential has very wide appeal then it likely should not be a micro-credential. Instead, the selection of stakeholders should be those that the micro-credential is directly targeting (i.e., people who are anticipated to be among the first to choose the micro-credential). Other stakeholder feedback can be used, but not at the expense of the primary stakeholders.

A secondary, but just as critical, challenge related to stakeholders is making sure that the assessment is generating data that is believable to the stakeholders. A stakeholder may not provide reliable or accurate data for the measurement (e.g., students not providing honest feedback, employers not actually understanding their employment process), which may hurt its believability to all stakeholders. This will result in an assessment that is meaningful only to the creator of the assessment and will have limited ability to be actionable. Consequently, once the assessment is created, it should be verified among the stakeholder as believable by either consulting them informally or forming focus groups to generate feedback.

Addressing Potential Challenges Regarding Value Types

Another likely early assessment challenge is the overemphasis of Normative Values. While the Normative Value of a micro-credential is likely the purpose for its design (e.g., we designed a micro-credential to increase student participation 10x), it can be a mistake to choose the Normative Value as the immediate value by which the micro-credential should be assessed. Just as with many educational programs, it may take several iterations and time before the micro-credential is mature and can accomplish the normative value it was designed to do. Consequently, an assessment Ratio that compares a Revealed Value to a Normative Value could be overly critical in early assessments. It may be more useful to either create a Ratio that compares Perceived Value to Normative Value, or even Perceived Value to Revealed Value, with the latter Ratio just establishing if the assessed micro-credential is being accurately interpreted. At a later point, once the micro-credential has been tested and iterated, then a focus on Normative Value will likely be merited.

Addressing Potential Challenges Regarding Data

Finally, it is critical the data storage and methods for analyzing the data adhere to best practices. This can be as simple as keeping data stored in a secure system but can also extend to how the data is analyzed. Simple mistakes in basic calculations can destroy even the best-intentioned assessment process.

SAMPLE ASSESSMENT PROCESS

The following is a narrative example of the process of creating a micro-credential assessment. We provide this example as a way to illustrate the comprehensive process of assessing a micro-credential's value.

In this example, a university wants to create a micro-credential that will increase undergraduate student engagement in STEM activities on campus. Through earning the micro-credential, students will have worked together on solving a problem for the local community by utilizing their STEM skills. Evidence that the students have earned the micro-credential include both documentation of the project and testimony from community members who have benefited from the project. The goal for the assessment is to both guide the creation and iteration of the micro-credential.

The first step in creating a value assessment for this micro-credential would be to identify the stakeholders. The university is the Issuer of the micro-credential since they are its creators. The Earner of the micro-credential are university students who are interested in STEM projects. Interestingly, the Viewers are not the community members who benefit from the project since they do not use the micro-credential. In this example, we could either decide that the students are also the Viewers of the micro-credential, potentially using the micro-credential as motivation to complete the project, or that there are no relevant Viewers of the micro-credential. If the lack of clear Viewers is considered a challenge, then it may suggest a redesign of the micro-credential.

The micro-credential assessment values can now be identified through communication with the stakeholders. The creators of the micro-credential believe that student engagement in a STEM project will lead to more interest in STEM courses on campus, and potentially STEM careers. While this interest could be classified as related to cost (e.g., students willing to pay for STEM courses), given that the micro-credential is a co-curricular activity, time seems to be a better fit as a proxy value for the micro-credential goal (i.e., more time spent on STEM activities after the micro-credential is completed). In addition, while the Normative value of more careers in STEM is a hoped-for outcome from earning the micro-credential, it is not immediately measurable. Instead, Perceived and Revealed values offer immediate, actionable feedback (i.e., how much time students expects to spend, how much time students are actually spending).

Because this is the first assessment of a micro-credential being newly implemented, student perception of time to earn the micro-credential must be the initial value measured. A review of these decisions from university administration verifies the choices, but an additional issue is uncovered. It is known that competing university activities do increase student interest

in STEM by X amount of time. There are some university administrators that are concerned that the time spent implementing the micro-credential is not as efficient as those other potential efforts. While there is approval to implement the micro-credential, there is an additional goal to create an assessment that offers feedback on efficiency of the micro-credential.

So, the initial ratio of the assessment would be Revealed Time X compared to Perceived Student Time Y. Because X is the targeted minimum, it can be used as the denominator in the Ratio – with a percentage being generated that can be interpreted as how close the micro-credential is to increasing the time students spend similar on STEM to the other opportunities (Y/X). This percentage may even be larger than 100% if the micro-credential is more effective than other opportunities.

Because X is already known, the assessment just needs a measure to ascertain student perception of time they would spend on STEM activities. Because the project is associated with the micro-credential is STEM related, then we want to measure both perceived time spent on the project as well as time spent on other STEM activities. For the purpose of comparing similar measurers, we design our assessment measure to match X, which is listed in hours (X was calculated based on prior student survey issued by the university). So, our measure is the following survey:

1.1. How many hours per week did you USUALLY spend on STEM activities before this micro-credential? Please provide your answer in Hours.

1.1.1. *Additional explanation on 'STEM activities' may be provided, based on how the survey for X was implemented.

1.1.2. *The purpose of this question is to baseline the students. If X is significantly higher or lower than student answers to this question, then we can adjust our measure of Y accordingly.

1.2. How many hours per week would you/will you spend on this Micro-credential?

1.3. How many hours per week will you spend on STEM activities once you complete this Micro-credential?

We next test the survey with a small number of students who have completed the micro-credential, and based on the accuracy of their answers we then issue the assessment at scale. The data from 1.1 matches X, so we feel confident in the data generated in 1.2 and 1.3. Each of these values offer a variation on Y and so we can generate a value for both, based on what stakeholders wish to know.

In this hypothetical case, the Y value is larger than X, suggesting that the micro-credential is achieving its goal more than other options.

This information can be used to determine that the micro-credential is effective and should be permanently offered at the university. In addition, when other micro-credentials are assessed, their values can be compared to this micro-credential to determine which micro-credentials are most effective.

CONCLUSION

This whitepaper has laid out theory, a framework, and examples for creating assessment for the various types of micro-credentials that are offered in higher education. By focusing assessments and their corresponding impacts on perceived, revealed, and normative values from multiple stakeholder perspectives, institutions can align micro-credentials with their educational and operational goals. The practical assessment models suggested here are designed to be modified based on the different characteristics of each micro-credential but still generate assessments that enable comparison between them, allowing for implementation in diverse educational settings while also meeting institutional needs.

As the landscape of higher education micro-credentials continues to develop, the methodologies discussed will enable institutions to stay at the forefront of innovation, allowing them to improve their micro-credential offerings and determine where micro-credentials best fit within an institution's educational opportunities. Further, the assessments discussed in this whitepaper will preserve micro-credentials' ability to contribute effectively to learning outcomes and career readiness.

We hope this whitepaper is valuable in your effort to create an assessment for any micro-credential you may be offering. We encourage educators and administrators to utilize the assessment examples provided as a starting point for developing a robust evaluation system that reflects the unique values and aspirations of their institutions and stakeholders, and the contact us with suggestions, improvement, and ideas.

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APPENDIX

Examples: Perceived Time/Revealed Time

	Issuer Perceived Time to Issuer Revealed Time	Earner Perceived Time to Earner Revealed Time	Viewer Perceived Time to Viewer Revealed Time
Ratio	Amount of time university would like to spend developing or administering the micro-credential compared to actual amount of time spent.	Amount of time students are willing to spend earning the micro-credential compared to actual amount of time students spend earning the micro-credential.	Amount of time an employer is willing to spend to parse or use the micro-credential in decision making compared to actual amount of time spent (e.g., viewing/ interpreting).
Action Potentials	Planning; optimal use; resource allocation.	Communication of requirements; managing expectations; designing micro-credentials.	Understanding usability; developing communication strategy.

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