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# Motivational Tiered Assessment: A New Grading Approach for Motivating Information Systems Students

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**Abstract:**

Academia places significant weight on grades as a metric to assess how much students have learned (Beatty, 2004). As a form of assessment, however, grades alone do not provide room for feedback and further student development. This paper offers a new direction to information systems (IS) programs to improve student motivation and better assess student learning—motivational tiered assessment (MTA)—that we propose overcomes these concerns. A tiered approach to learning allows students to choose how much effort and commitment they want to apply and assesses students' competence based on the performance outcome they choose to achieve by meeting a specific set of pre-determined specifications and expectations. We first explain how MTA works. We then delineate how the new system differs from the points-based grading system, which academia commonly uses. We conclude by presenting three class examples that illustrate how one can apply MTA across an IS curriculum.

**Keywords:** Motivation, Assessment, Grading, Specifications.

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# 1 Introduction

Higher education places a considerable weight on grades: "assigning grades is probably the most important measurement decision that classroom teachers make" (Chiekem, 2015, p. 24). Academic performance determines whether students obtain admittance to top graduate programs, it determines who graduates with honors, and it acts as a gatekeeper for elite job opportunities (Kuncel, Crede, & Thomas, 2005). Yet, given the considerable weight that higher education places on grades, business school scholars have spent surprisingly little time considering how effectively current grading practices measure and motivate student learning (e.g., Hiller & Hietapelto, 2001; Dobrow, Smith, & Posner, 2011; Elliott, 2008; Peterson & Peterson, 2016)[1].

This lack of scholarship matters because, when grades as extrinsic rewards become education's primary emphasis, higher learning institutions and students can become distracted from more aspirational objectives, such as appreciating learning's intrinsic value and developing new skills (Beatty, 2004). Substantial anecdotal evidence suggests that grading practices in higher education need improvement (Millet, 2016; Rojstaczer & Healy, 2012; Franz, 2010). Grades purportedly separate the exceptional from the competent and the competent from the incompetent, yet students, employers, and even faculty struggle to connect a grade to a specific skillset. Employers complain that academic performance metrics (e.g., grade point averages) fail to differentiate students once hired (Thompson, 2014). Grade inflation has become so problematic in some institutions that most students are not just above average: most are *exceptional* (Millet, 2016; Rojstaczer & Healy, 2012; Franz, 2010). In an attempt to restore validity to the process, some institutions have imposed arbitrary assessment approaches (e.g., grading on a curve), which arguably treats the symptom, not the underlying problem (Guskey, 2001; Grant, 2016). One professor described it succinctly: "grades create a facade of coherence" (Jaschik, 2009).

Given these considerable stakes and concerns, information systems (IS) educators need to improve students' intrinsic motivation for learning by rethinking how they grade. In this paper, we offer a new direction to overcome these concerns: motivational tiered assessment (MTA). To develop the MTA model, we built on prior research (Schimmer, Hillman, & Stalets, 2018; Buckmiller, Peters, & Kruse, 2017; Rylaarsdam & Heinz, 2016; Nilson, 2015; Dobrow et al., 2011) to create a tiered approach to learning and assessment in an IS program. MTA bundles achievements into tiers that represent higher levels of knowledge and competency. MTA allows students to choose how much effort and commitment they want to apply and provides opportunities for constructive feedback and iteration as they progress. Students' performance in each assignment depends on their ability to achieve a detailed set of pre-determined specifications. Finally, students know what they need to do to achieve a grade because the MTA model carefully delineates the standards they need to achieve when a course begins.

# 2 An Overview of Motivational Tiered Assessment

A common approach for assessing IS students' performance involves using a points-based grading system[2]. Instructors award students a percentage of possible points when they demonstrate some proportion of understanding the material (i.e., partial or complete understanding). Instructors may score partial credit as a percentage (e.g., 74% on a test) or as the total number of earned points. The total amount of partial credit that the student accumulates over the course (often combined with each assignment's relative weight) results in a final point total or weighted average, which becomes the basis for the student's final course grade (Iamarino, 2014). As an example, a database course might have a mid-term and a final exam that each account for 35 percent of the final grade, one data modeling project that accounts for 20 percent of the final grade, and various homework assignments that account for 10

[1] We searched the *Academy of Management Learning and Education*, *Communications of the AIS*, and the *Journal of Management Education* for the terms "assessment" (as specifically related to evaluating student performance and learning as opposed to self-assessment, instructor assessment, and so on), "grades", and "grading" in the title field. From this search, we found only 16 papers on determining course grades and assessing student learning—about one paper on assessment every four years.

[2] We acknowledge that not all IS and MIS courses use points-based grading and that the approaches can vary greatly across the world. We use the term "points-based" grading to describe any system that uses points or percentages to assign a final academic performance metric (e.g., a course letter grade in the US). While all points-based systems involve aggregating points or percentages, some also include partial credit in assignments and some do not. We use the term "partial credit" to describe when an instructor adjusts an individual assignment score to reflect partial completion and directly uses that value in the points-based grading system (i.e., allows students to offset a poor grade with a good grade).

percent of the final grade. Thus, the weighted average of the partial credit scores constitutes a student's overall performance in the course.

In contrast, MTA avoids using points or percentages: instructors simply assess assignments as "completed" or "not completed". Students know ahead of time what they must accomplish because the instructor provides clearly defined specifications for each assignment (Nilson, 2015). Students only advance toward higher course performance levels (e.g., course letter grades) when they complete assignments. Importantly, a "completed" score on one assignment cannot offset a "not completed" score on another. To achieve a higher letter grade, students must achieve more (or more difficult) assignments (Buckmiller et al., 2017; Scriffiny, 2008; Iamarino, 2014).

By eliminating points and the ability to offset learning goals with partial credit, MTA proposes to improve grading reliability and validity, to increase student motivation and perceived fairness, to improve assessment rigor, and to reduce grade inflation. MTA can also reduce grading time and faculty workload (Bonner, 2016). We summarize the partial credit versus MTA philosophies in Table 1, and we cover each philosophy in more depth throughout the paper.

**Table 1. The Driving Philosophies of Points-based Grading versus MTA**

| Grading concern | Points-based grading philosophy | MTA philosophy |
|---|---|---|
| **Inconsistency; time** | **Judgmental grading**: instructors often select the concepts to grade and how many points to deduct after students have already submitted assignments. Awarding partial credit is work-intensive and error-prone, and results in students losing points without demonstrating understanding. | **Developmental grading**: instructors provide detailed specifications to students upfront, which enables them to know what they must complete. Instructors assess projects *in toto* based on whether they show students have achieved the listed specifications. In this way, the MTA philosophy simplifies grading simplified, and grading requires less time. |
| **Transactional nature of learning** | **Extrinsic motivation drives student learning**: this philosophy conditions students to learn only when they receive points. Instructors perceive students will not learn unless they get something in return. | **Intrinsic motivation drives student learning**: instructors give students goals to achieve, and the students decide which ones to complete. |
| **Locus of control** | **Faculty determine grades**: students must complete all assignments, and grades depend on scores across all assignments. | **Students determine grades**: students can choose whether to complete some assignments or not (within instructor established guidelines). |
| **Grades lack meaning** | **Grades as points earned**: students can offset some learning goals by earning higher points on other learning goals. Students who earn the same grade can, therefore, manifest different sets of skills and knowledge. | **Grades as competencies achieved**: students can achieve higher grading tiers only when they complete specific assignments; tiers map directly to specific skills and competencies. |
| **Learning timeline and learning from mistakes** | **Instructors determine the necessary time to learn a concept**: students must learn a concept by the project due date; they have little opportunity to learn from mistakes. | **Students determine the necessary time to learn a concept**: a revision policy allows students to extend due dates and revise work so that they learn from mistakes. |

## 2.1 Competency versus Partial Credit

As we describe above, many IS programs employ a points-based system that relies on partial credit as a basis for final course grades. When partial credit exists in the points-based system, students receive points that correspond to the degree that they complete a competency, which instructors often record as a percentage. MTA, however, positions competencies as binary, and instructors set the level that determines whether or not students demonstrate competence. Students who successfully demonstrate knowledge or competency provide direct evidence that they have achieved a learning outcome. Students who cannot do so provide direct evidence that they need to further develop their skills.

Under MTA, IS instructors set the exact specifications that students need to be competent in object-oriented programming, website development, and machine learning. They can easily adapt exams to MTA: an instructor might decide that, to "complete" an exam, for example, students must achieve a score of 85 percent or higher. Project competencies also use a binary approach, but an instructor should set high expectations levels to achieve the required competency: the instructor may feel, for example, that

simply developing a decision tree model may not qualify as "competence" for a machine learning project. Instead, in the specifications, the instructor may require that students select the correct machine learning approach given a complex scenario, present and justify their solution, and communicate the result in a memo. Students need to complete *all* specifications to complete the assignment and achieve competence: they cannot offset one to make up deficiencies in another because they cannot receive partial credit. Therefore, for each assignment, students develop the skills and knowledge necessary to achieve the competency and then instructors assess them relative to a list of specifications.

Final course grades also depend on what students complete. In a simplistic example, a student might earn a C from completing the mid-term and final exams, a B if the student also completes a data modeling project, and an A if the student also completes all the homework. Students who do not complete the midterm might earn a D, while students who fail to complete the final fail the course. We present more complete examples later in the paper, but this stylized example illustrates some critical shifts in mindset.

Although seemingly radical, a binary approach to assess competencies actually sees fairly common use both inside and outside academia. Top medical schools have increasingly moved to a pass/fail grading structure (Association of American Medical Colleges, 2019; Murphy, 2020). Technology-based certifications (e.g., Cisco and Microsoft) either award individuals for achieving a competency or they do not depending on how they score on the certification exam. The certified public accounting (CPA) exam requires that students achieve a minimum score across *all* sections to pass: in direct contrast to a points-based system that aggregates scores, students cannot complete the CPA exam by using a high score in one section to offset inadequacy in another section. Even popular children's organizations use competency-based approaches: it seems silly to say that scout scored "74 percent" in camping: instead, they earn a merit badge only when they demonstrate the skills and knowledge in the badge's specifications.

## 2.2 Learning from Mistakes: The Revision Process

As one advantage, MTA integrates opportunities to learn from mistakes at both the assignment and course level because students can continue to attempt assignments until they reach competence. Iterative learning opportunities incentivize students to persevere (and learn from mistakes) until they achieve competency, reinforce the idea to the student that they need to achieve competency (not perfection), and encourage students to take risks by accepting more challenging learning opportunities. Because MTA offers no partial credit, students must demonstrate full competency before they can receive credit for an assignment. If they submit an assignment that fails to complete at least one listed specification, they receive it back with detailed feedback (i.e., the specifications they failed to meet) and have the opportunity to revise the assignment. Students face no repercussions for revising, although instructors may limit resubmissions to keep the process manageable.

To illustrate how students can learn from mistakes under MTA, assume students receive specifications for a class in machine learning. The specifications state that students must complete a decision tree and random forest analysis, conduct and explain a train/test analysis, and generate and interpret the confusion matrix. They must explain all analyses in a professionally written memo that must contain an executive summary and an appendix with all statistical output. Assume a student completes all elements but misinterprets the confusion matrix results in the memo. Under MTA, the instructor returns the assignment, notes the mistake, and includes instructions for resubmission. This revision process allows instructors to embrace student mistakes as a valuable opportunity for student learning. After the student resubmits the assignment, the instructor need only review and correct the missed specification.

Of course, simply allowing students to make mistakes does not in itself represent an effective learning strategy. To provide value, students should reflect on why they made the mistake and have a chance to correct and learn from the experience. MTA suggests that students include the following reflections in all resubmissions (Hackman, 2002):

- Reflection 1: the specification(s) you originally did not achieve and why you did not achieve it.
- Reflection 2: what you did differently on the revision.
- Reflection 3: what you learned from the revision.

Returning to the machine learning class example, the student must complete the reflections, review class exercises and notes, understand how to correct the confusion matrix analysis, and incorporate it into the revision. This iterative revision process illustrates another advantage that MTA offers: it allows students to

learn at their own pace[3]. If a student fails to complete the above assignment the first time, for example, the student still has more time to understand the concepts while still staying on track.

Many strategies exist to keep the revision process manageable. Instructors can require students to achieve certain competencies before a certain date. Rather than making up an entire exam, the instructor might require that students redo only the parts they missed. If an exam contains problems, for example, students might simply demonstrate their understanding by completing a similar problem during instructor office hours. If students fall below the minimum score requirement (e.g., 85%) for a multiple-choice test, a graduate student could review the missed problems with the students by asking them to reflect on their mistakes, to provide their updated answer, and explain why the new answer is correct.

Another common practice involves using a token-based system to help manage the revision process (Nilson, 2015). Students receive a limited number of tokens when a semester begins, which they may use in various ways. In a recent semester, for example, the first author gave each student four tokens and allowed them to use the tokens to revise and resubmit a homework assignment or exam, push back an assignment deadline by 24 hours, or drop one quiz grade at the end of the semester. Thus, tokens also give students greater flexibility in managing their academic obligations since they have greater autonomy over meeting deadlines and managing their time.

Students who use a token to successfully revise and earn a completed score receive no other deductions or penalties. If students fail to complete all specifications on an assignment but used up their tokens, they cannot revise the assignment, and the instructor scores it as “not completed”. For this reason, instructors must carefully consider how many tokens they allocate to students. Allocating a large number results in more iterative learning (and more re-grading) but also decreased student motivation to complete the assignment the first time. Setting the number too low, however, de-emphasizes iterative learning and can overly penalize minor mistakes.

## 2.3 Transforming Tiered Learning Assessments into Final Letter Grades

To transform completed assignments into course letter grades, instructors design tiers of bundled assignments. Each tier is associated with a letter grade, and achieving a higher tier requires more (or more difficult) work. In the simplest example, an instructor might assign an F if a student completed no assignments, a D for one completed assignment, a C for two completed assignments, and so on. In practice, of course, higher tiers usually require more effort and involve more difficulty.

As a practical starting point when designing grading tiers, instructors can define the required level of competency or knowledge that meets the minimum requirements for the course. This level constitutes the C tier. Instructors can then define higher and lower grades relative to this competence level. Because major assignments (i.e., the assignments that had the highest percentage weight under the points-based system) assess students across the most (and presumably most important) learning IS outcomes, major assignments should primary drive the tiers. Once instructors have considered major assignments, they can integrate minor assignments (e.g., quizzes, short essays, and homework assignments) into the grading tiers.

As an example, assume an instructor feels that all students should be able to complete the mid-term and final exam to demonstrate the minimum level of competence and knowledge for a course. Therefore, the start of a MTA tiered design might appear as follows:

- To earn a C, students must complete both the midterm and the final exam.

Although MTA discourages points and partial credits, instructors can easily adapt them. Instructors can set a minimum score to complete an exam (e.g., 85%). A difference between partial credit and MTA, however, is that, with MTA, there is no effective difference between, say, an 86 percent and a 96 percent

[3] In a recent "Revisionist History" podcast, Malcolm Gladwell examined the differences between “hares” and “tortoises” when taking the LSATs in preparation for law school. He found that hares—who reason fast but retain little—outperform tortoises—who take time to consider the arguments more carefully before deciding. This performance difference results from the limited amount of time allocated to reason out the questions on each part of the test, which reflects a dilemma: we want lawyers who are *tortoises*, not hares. His point was that learning something fast is less important than learning it well. In academia, of course, exams—with their specified timelines and high stress atmosphere—also reward hares and punish tortoises. Perhaps of even greater concern, timed exams may teach tortoises to *become* hares. MTA counters this trend by focusing more on *whether* students learned the concepts, not *when* they did.

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since both exceed the required threshold. However, we later illustrate how instructors can add additional differentiation in the tiers for exams.

Next, the instructor might require more work to achieve the B tier:

- To earn a B, students must complete the requirements for a C but must also complete all homework assignments.

Finally, the instructor might differentiate A and B students by requiring work that challenges them more cognitively (Bloom, Engelhart, Furst, Hill, & Krathwohl, 1956) and so might require a student-driven research paper:

- To earn an A, students must complete the requirements for a B but must also complete a research paper on a topic that the instructor approves.

The instructor can then define the grades D and F relative to the C grade. For example, the instructor might reserve a D for students who complete the final but not the mid-term exam. Students fail the class if they do not complete the final. Next, the instructor can refine the tiers for minor assessments, such as chapter quizzes. The instructor may decide, for example, that students who score 90 percent or better on the chapter quizzes earn the "plus" version of the tier, while average quiz scores below 80 percent earn the "minus" version. The instructor can use a similar strategy for attendance if desired.

Note that students must achieve *all* requirements in a tier to achieve the tier. Students who fail to complete one homework assignment, for example, would not qualify for a B—even if they completed the research paper. The highest possible grade they could achieve would be a C+ (assuming they scored 90 percent or better quiz score). Therefore, when designing the grading tiers, instructors must consider the possible scenarios to ensure that they accurately translate their intent into the resulting final letter grades. They should consider including different scenarios in the syllabus to clarify for students how the tiers translate to letter grades.

The resulting tiers reflect definable and significant differences in accomplishment between the letter grades. In the above grading system, a C student completes less work than a B student, who completes less difficult work than an A student. C students have achieved less (and are less competent) than A or B students. Students who self-select out of the research project have chosen to accept a B; students who decide to opt out of the homework have decided to accept a C.

No matter their final course grade, under MTA, *students* choose the outcome based on their level of interest, time, and motivation for the class. Because students' grade depends on the tier they complete, MTA gives them greater control over their final grade in the class. Students choose how hard they want to work, the difficulty of the work they want to do, and the eventual final grade they want to earn. As the semester progresses, of course, students can opt into lower grading tiers in exchange for less work. Previous research has found such choices to increase student interest. For example, Dobrow et al. (2011) studied the grading paradox—the tension between the desire for higher grades at the expensive of intrinisc motiation—in a management classroom by giving MBA students the opportunity to exercise choice about their final course grade, which had a powerful effect on their interest in the course itself and in taking a future course on the same topic (Dobrow et al., 2011). Therefore, the choice and control that instructors provide to students with MTA can increase their intrinsic motivation to perform at the level they choose.

## 2.4 The Effect of MTA on Instructor Workload

When grading assignments under MTA, instructors need only focus on *whether* students achieved a specification, not (per partial credit approaches) the *degree* to which they achieved it. When grading assignments, instructors need only determine if students achieved all specifications.

Therefore, when designing the final grade tiers, instructors must ensure that students can achieve each tier but also that each tier requires significant additional student effort. Thus, they need to focus on achieving a balance: rewarding motivated students who complete significant work with higher grades but also providing an opportunity for students to self-select into a lower tier in exchange for less (or less difficult) work. Because some students will opt out of assignments in exchange for lower grades, the number of assignments faculty must grade will decline.

This approach strongly differs from the points-based mindset in which instructors typically expect students to complete all assignments that they must review and evaluate. In addition, faculty must also assess the

*degree* to which each student answered the question correctly and consistently deduct the appropriate number of points. The final course grade then results from the students' average partial credit score across all submissions. In contrast, under MTA, students submit only the necessary assignments to achieve their desired grading tier.

In a recent semester, for example, the first author required a significant research project for students to earn an A in his machine learning course. Students content with a B or lower, however, could opt out. By the end of the semester—with the increased time constraints and the stresses of final exams looming—40 out of 78 students (52%) chose not to complete the assignment. This design resulted in approximately half of the students self-selecting into a lower letter grading tier—that is, accepting at most a B in return for less work. At the end of the semester, therefore, the instructor graded only 38 projects from the highly motivated students who sought an A who all successfully completed the project. This outcome contrasts with the traditional approach, which would have resulted in the instructor grading 78 partial credit projects, some of which would have been from students seeking only sufficient partial credit to earn a lower grade.

# 3 The Theoretical Foundations of MTA

In this section, we explore how MTA enhances student learning and motivation, grade reliability and validity, and student and instructor wellness. We also explore how it overcomes weaknesses in the points-based grading model.

## 3.1 Student Learning and Motivation

Under the points-based grading system, instructors reward (i.e., reinforce) desired behavior (e.g., award points for correct answers) while punishing maladaptive behavior (e.g., deduct points for wrong answers). This approach reflects the psychological theory of behaviorism (Skinner, 1938; Moore, 2013), which focuses on individual's overt behaviors. Behaviorist studies rely on reinforcement or punishment, which results in subjects associating their behaviors with positive or negative outcomes. Behaviorism adopts the premise that reinforcers or appetitive stimuli (e.g., receiving a good grade on a well-written essay) will encourage the desired behavior in the future. Punishment or noxious stimuli (e.g., losing points for mistakes) will attenuate undesirable behaviors. Radical behaviorism purposely abandoned attempts to understand human cognition: instead, it focused on examining subjects' overt behaviors and responses, which researchers thought to be easier to observe and understand (Moore, 2013).

Research on motivation indicates, however, that although using punishment can effectively attenuate a targeted behavior, the punished behavior tends to return when the punishment disappears (McLeod, 2018) as B. F. Skinner, a leading behaviorist, has described:

> *It's often true in education, the teacher wants the student to be quiet and study can threaten him and get that result. But, of course, the student only studies under that pressure and once you release it he'll never study again. But if you can induce him to study for other reasons, which is much more difficult and requires a much better understanding of human behavior you have a permanent result because you'll be using consequences which continue in his life as he goes on in the world.* (McLeod, 2018)

Hence, relying on practices grounded in behaviorism suggests that, even if instructors provide constructive feedback, punishing students by reducing scores does not improve understanding and affects behavior only as long as they take the class. As a developmental measure when awarding points, of course, instructors may include constructive feedback, which communicates how students might improve. Unfortunately, unless students have an opportunity to revise and improve their score, they will tend to ignore the supplied feedback (Weimer, 2014; Crisp, 2007). Ironically, making mistakes is a primary factor that drives individuals to improve their understanding and initiate deeper learning (Metcalf, 2017). This suggests that, because points-based assessment relies on reducing scores for mistakes, it is ineffective for achieving the goal of long-term student development.

When instructors present low grades as a valid way to measure student learning (and—by extension—students' intelligence), they imply the results truly indicate students' ability and potential (Elliott, 2008). Hence, using a points-based system may have longer-term negative consequences. Students who receive low grades that lack developmental guidance may become inured to academic failure and believe, for example, that they cannot program adequately, perform poorly on tests, or even lack intelligence. Recent evidence suggests that using punishment and negative reinforcement may be especially harmful

for first-year and second-year university students (Conley, Shapiro, Huguenel, & Kirsch, 2018). Based on this discussion, we propose that the use of a points-based grading system is inconsistent with the goals of higher education because it discourages students to learn and develop their knowledge and skills[4].

In recent decades, psychology theorists have recognized the importance of cognition in understanding human behavior, and so reliance on behaviorism as a theoretical paradigm has significantly declined (Scandura, 2015). Current assessment practices in many IS programs and business schools, however, remain mired in their behaviorist foundations. Well-established theories of motivation, such as self-determination theory, self-efficacy, expectancy theory, and goal-setting theory, have their foundations in human cognition and should, therefore, help one understand MTA's benefits. For example, self-determination theory proposes that, when people freely choose an activity, voluntarily complete their work, and choose the outcome they want to achieve, they will have higher motivation than when they face tasks that are presented as non-discretionary obligations (Deci & Ryan, 2012; Reeve, 2002). Under MTA, students have greater autonomy over their grade: they essentially can decide—depending on the amount or difficulty of work they want to complete—their final letter grade. Therefore, self-determination theory suggests that students will be more motivated under MTA than under a points-based grading system.

Another theory of motivation, self-efficacy is the belief that one has the skills and abilities necessary to successfully perform a certain task and can effectively convert those skills into a chosen outcome (Bandura, 1977a, 1977b). MTA posits that instructors will provide students a detailed specification list for each assignment, which will offer similar benefits a grading rubric. Students also know what they must complete to achieve each grading tier. Students then have the opportunity to evaluate their own self-efficacy toward the level of learning they want to achieve and the corresponding work that they need to perform. Previous research suggests that self-efficacy plays a central role in determining human agency (Markham, Balkin, & Baron, 2002). Research has also demonstrated that individuals with strong self-efficacy in a certain task are more likely to pursue, persist, and succeed in that task (Bandura, 1977a, 1977b). People's level of self-efficacy depends on their perceived control over their expected outcomes (Bandura, 1977a, 1977b, 1986, 1997). Therefore, individuals should have higher self-efficacy under MTA since they essentially know exactly what they must do to complete each assignment and to achieve each grade.

Researchers widely accept expectancy theory as an explanation of motivation, intention, and the value in bundling assignments and detailed specifications into tiers (Vroom, 1964; Scandura, 2015; Hsu, Shinnar, & Powell, 2014). According to expectancy theory, individuals' willingness to perform certain tasks depends on their expectations that the effort exerted will successfully lead to a particular outcome and that they will find the outcome appealing (Renko, Kroeck, & Bullough, 2012). Therefore, compared to points-based grading, MTA should improve students' motivational levels because they have the capacity to choose the desired outcome (i.e., grade tier), know precisely what they need to do (i.e., detailed specifications), and believe in their ability to complete the task (i.e., the opportunity to correct mistakes through revision) (Hancock, 1995; Isaac, Zerbe, & Pitt, 2001). Further, students will be motivated to exert more effort to achieve the grade they want when they believe that the effort will lead to the necessary performance for that grade (Hsu et al., 2014).

Goal-setting theory (GST) represents another relevant motivation theory for MTA that also ties the above theories together (Locke & Latham, 1990). GST states that people are motivated to work harder and perform better when they have specific goals that they do not find too easy and that do not conflict with other goals and when they commit to and believe that they can complete the required tasks (Locke & Latham, 2006). GST helps explain why MTA is effective for motivating students toward hard work and good performance. When students decide they want an A (self-determination theory), commit to doing what they need to do to earn that grade (the most difficult grade) (challenging goal), clearly understand exactly what they need to do (expectancy theory), and believe in their ability (self-efficacy), then they will be motivated to work hard and persist in order to perform at the necessary level to earn the A.

[4] Prospect theory, which predicts that students will focus on avoiding loss when faced with potential gain and loss, also supports this behavior (Kahneman & Tversky, 1979). The theory predicts that, when students can choose a difficult class in which they could learn a lot (potentially high gain) but risk a low grade (high expected loss), they will be risk averse (i.e., they will choose a class in which they learn less but have a higher chance of a good grade). Unfortunately, such behavior anecdotally mimics the behavior of many college students who tend to take easier classes (and avoid learning) in the hope that they will earn higher academic performance metrics.

## 3.2 Grade Reliability and Validity

At the very least, students expect grades to reliably and validly reflect their performance on a class assignment. Grade reliability refers to the degree that an assignment is measured without error and is a necessary condition for grade validity. In this paper's context, we consider grade reliability as how consistently instructors apply a grading standard across students. In practice, instructors can compromise grade reliability in many ways, such as via inconsistently applying grading criteria or the weights for those criteria (Brookhart & Guskey, 2019). One study found that, when instructors rely on unreliable and ad hoc grading practices, they tend to inflate lower grades to avoid confrontation with low-scoring students (Millet, 2016). In effect, these steps result in different grading standards for different students and, therefore, compromise grade reliability.

Grade validity reflects whether one truly measures one what measures—that is, whether the grade has meaning and accurately reflects a student's performance level in a course relative to the course's relevant learning outcomes (Wiggins & McTighe, 2005). We use an example to illustrate how a points-based system compromises grade validity (see Table 2). The exams have equal weighting and all reflect important concepts in the course.

**Table 2. Points-based Grading Example**

| | Exam 1 | Exam 2 | Exam 3 | Exam 4 |
|---|---|---|---|---|
| Student 1 | 84 | 87 | 83 | 83 |
| Student 2 | 100 | 47 | 90 | 100 |
| Student 3 | 70 | 75 | 95 | 97 |
| Student 4 | 100 | 79 | 79 | 79 |

All students have 337 points (and an 84.25% average), so each will earn a B final letter grade. In this way, the points-based grading model assumes that all students have learned the same amount. Student 4, however, obtained "average" scores in three out of four exams (79%) but still achieved an "above average" final grade. Across the class, the students scored below a B in no (student 1), one (student 2), two (student 3), and three (student 4) tests but achieved the same final grade. As for a whether a grade indicates a student's ability, if a company hires the second student because the student purportedly understands concepts in the second exam at an "above average" level, the company would be sorely disappointed. Offsetting partial credit results in all students receiving the same grade even though each one learned (and failed to learn) different concepts.

Hence, relying on a points-based grading system to gauge students' performance can significantly impact grading validity. Although points-based grading seems innocuous, its widespread use to gauge students' competence and knowledge results in misleading conclusions about their knowledge and competence. If a student scores 75 percent on an exam, for example, the student failed to learn 25 percent of the material, but the final grade in the class fails to identify what 25 percent the student failed to learn.

Therefore, in practice, the B letter grade in practice reflects that students achieved above average results *in aggregate across all learning outcomes*. Based on this final letter grade, however, employers and graduate admissions committees will make inferences about an undergraduate's *specific* competencies. But because a final letter grade is an aggregate assessment, inferences made about specific competencies will be subject to error. Therefore, using the points-based grading system as in the above example masks students' specific knowledge and competencies since the system rewards partial understanding.

The second (and perhaps even more concerning) problem regarding the student's 75 percent test score: when does the student ever learn the 25 percent that the student failed to understand? Once the student earns a 75 percent on an exam, the class moves on to the next concepts. Since the class has moved on, the student's attention shifts to these concepts and other partial credit opportunities. Thus, by leveraging partial credit, IS students can complete their degree while never obtaining certain critical skills or understanding that one would expect IS majors to obtain. In contrast, MTA integrates opportunities that allow students to obtain the missed concepts.

Grade inflation also poses a threat to grade validity (Rojstaczer & Healy, 2012; Franz, 2010). Assuming a C represents average achievement and an A represents exceptional achievement, letter grades' meaning

(and, therefore, validity) as a method to operationalize learning have been severely compromised. One study found that, in the last ten years, 43 percent of college grades achieved an A:

> *As a result of instructors gradually lowering their standards, the "A" has become the most common grade on American college campuses: without regulation, or at least strong grading guidelines, grades at American institutions of higher learning likely will continue to have less and less meaning.* (Rojstaczer, 2012, p. 2)

The lack of GPA variation has also significantly diluted its utility as a discriminator for future employers.

Low grade reliability and validity have significant implications for academia because—as we illustrate above—current practices mask what IS students can and cannot accomplish. Studies have found rubrics to improve grading reliability when using partial credit in an assignment since they structure the grading process for instructors while providing feedback to students (Stevens & Levi, 2005). Without a rubric to guide them (and to clarify a grade's basis to students), IS instructors further compromise validity because they can effectively decide to punish, reward, and ignore whatever they want. MTA requires specifications, which resemble rubrics in that they delineate the requirements for an assignment before students complete it, structure assessment, and communicate IS instructors' expectations to students. Specifications differ from rubrics, however, in that they include more detail and usually adopt a binary grading method (completed/not yet completed). In this way, they enhance the reliability and validity of the grading process since the instructor's decision is cognitively simpler: instructors must simply judge whether a student has completed each specification. Instructors who currently use rubrics may be able to adapt them to MTA. Instructors should consider the rubric level that establishes minimum student competence: they should expect students to achieve this level across all assessed criteria on the rubric. Instructors should give students who fail to achieve the minimum level an opportunity to revise by incorporating the rubric's feedback.

Based on this discussion, we posit that grades lack meaning under a points-based grading system and that they neither reliably nor validly measure specific learning objectives. Grades take on new meaning under motivational tiered assessment since each letter grade tier requires a significant marginal improvement (either in the amount or difficulty of work) over the next lower tier. Referring to the earlier machine learning example, if a company asks a student what the student learned in the class, the student can specifically refer to the research project that the student needed to complete to earn an A. The project's details ("I designed a 3NF database for an online company, populated it with data, and implemented various SQL queries to provide the users valuable information") add value and help discriminate job candidates.

## 3.3 Student and Instructor Wellness

Companies primarily use periodic reviews with supervisors to provide feedback about how employees can how to improve their performance. Unfortunately, academia makes no such pretense. Grades *judge* rather than *develop*. This mindset has repercussions, and students have understandably learned that low grades have consequences. Under a points-based system, students have learned to seek higher grades by "grade grubbing"—trolling for additional partial credit points in an effort to maximize substandard work's value (Buckmiller et al., 2017). These awkward situations have increasingly occurred over the years, and instructors can find it frustrating and stressful to manage students' grade expectations.

Faculty may be surprised to learn that students also face heightened stress and that much of that stress results from their academic experiences (Elliott, 2008; Buckmiller, Peters, & Kruse, 2017). College costs have risen much higher than inflation in the US over the past few decades, which makes the implications of poor academic performance more severe than for previous generations. Hairsplitting decisions to determine grades—coupled with the compression resulting from grade inflation (Franz, 2010)—can magnify the difference in students' minds between an A- and a B+. The American College Health Association found that 51 percent of college students felt "overwhelming anxiety", and almost one-third reported feeling so depressed that they found it difficult to function. Almost one-half reported their academic responsibilities as either traumatic or difficult to handle (Nilson, 2015). Some have posited that the Millennial Generation—with its propensity for rewarding participation over accomplishments—feels entitled to good grades (Twenge & Campbell, 2009; Greenberger, Lessard, Chen, & Farruggia, 2008) given the high costs and stress levels of attending college (Bergman, Westerman, & Daly, 2010; Menon &

Sharland, 2011). Among the categories academics, family problems, intimate relations, finances, and sleep difficulties, academics scored the highest as the cause for reported stress levels (Nilson, 2015)[5].

Instructors' grading practices may also contribute to students' inordinately high stress levels. A useful framework that Ambrose et al. (2010) proposed for explaining student motivation provides insight into the sources of student college stress. The model posits that for students to be motivated to learn, three factors must be present: students must see value in what they are learning, they must perceive the learning environment to support their learning efforts, and they must perceive they have the ability to complete the assigned tasks (Hansen, 1989; Ford, 1992; Ambrose et al., 2010). Compromising even one can have deleterious effects on student motivation.

Because a points-based grading system punishes students for making mistakes, students will likely perceive it as unpleasant and punitive rather than supportive and positive. The points-based grading system reinforces students' perceptions that grades do not directly result from their efforts and abilities but rather that instructors foist grades on them (Singleton-Jackson, Jackson, & Reinhardt, 2010). This external (as opposed to internal) locus of control bolsters feelings of frustration and helplessness and, therefore, undermines grades' ability to motivate since students perceive that they have little control over the outcome (Bolkan & Goodboy, 2013; Arum & Roksa, 2014).

Therefore, using a points-based grading system will likely increase student incivility (Burke, Karl, Peluchette, & Evans, 2014) and reduce students' self-efficacy and the extent to which they perceive that the system supports them. Students may then have feelings of hopelessness, characterized by defeatism, disengagement from the class, and absenteeism (Hansen, 1989; Ford, 1992; Ambrose et al., 2010). Students who can maintain their self-efficacy when faced with low grades may become defiant (e.g., they may challenge grading standards in a confrontational manner) (Bergman et al., 2010; Menon & Sharland, 2011). In the most severe cases, students who eventually come to see no value from the experience will manifest a rejecting or evading attitude and completely disengage from the class (e.g., texting with friends during class, sleeping).

MTA improves on a points-based grading system by targeting the three levers of student motivation. Under MTA, students receive the standards for each assignment when instructors assign it. Therefore, students know the criteria and expectations ex ante. MTA also empowers students to select the grade they want to achieve given their motivation and level of interest: students may even have the option to skip an assignment in return for a lower final grade. Even in situations where they fail to meet the specifications, students can resubmit an assignment for reconsideration without endangering their final letter grade. These features will likely bolster students' self-efficacy and feelings that the environment supports them.

MTA increases students' locus of control over their academic performance, which reduces the endemic uncertainty in the points-based grading system. Rather than requiring students to complete all assignments (which might result in a low grade), MTA enables students to opt into their achievement level, which increases their motivation. This approach gives students greater flexibility to choose which classes to focus on, to schedule their time, and to choose classes that might otherwise provide a greater risk of failure. In addition, instructors do not have to grade lackluster efforts that strive for sufficient partial credit to earn lower grades since submissions come from only students who want to earn the higher grades.

Based on this discussion, we posit that the points-based grading system compromises student and instructor wellness by generating considerable stress and conflict. These MTA features suggest that its adoption in IS programs would enhance students' perceptions about their self-efficacy and the environment's supportiveness. Moving away from a points-based grading system will not only improve grading validity but also reduce stress levels for both students and faculty. By combining enhanced self-efficacy and clearly defined specifications, MTA should result in more motivated IS students (Ambrose et al., 2010, p. 80).

[5] We note that all these studies occurred *before* the COVID pandemic, which of course heightened stress to an even greater level (for both students and faculty).

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# 4 MTA in Three IS Courses

In this section, we present three example IS courses (a database course, an analytics course, and a Web development course) and their major learning outcomes to illustrate different techniques and approaches that instructors can use to implement MTA (see Table 3). We selected these courses as archetypes because their varied content demonstrates the MTA's variability across an undergraduate IS curriculum. To keep the example parsimonious, we selected only three high-level learning outcomes for each course.

**Table 3. Select Major Learning Outcomes**

| | Database course | Analytics course | Web development course |
|---|---|---|---|
| Outcome strategy | Holistic | Cafeteria | Hierarchical |
| Learning outcomes | • Model high-level business rules using entity relationship diagrams (ERDs)<br>• Construct a logical data model (LDM).<br>• Construct SQL queries that feature inner and outer joins, WHERE and HAVING clauses, aggregation, and UNIONs. | • Construct a deep learning neural network, assess its level of overfit, and use it to make predictions.<br>• Generate and interpret a decision tree, assess its level of overfit, and use it to make predictions.<br>• Complete a regression analysis, interpret its coefficients, diagnose any significant fit problems, and describe its predictive and interpretative efficacy. | • Design an attractive website using cascading style sheets, HTML, and Bootstrap.<br>• Code dynamic webpages that pull data from a relational database.<br>• Implement business logic into a website (e.g., add an item to a shopping cart, implement a search engine) using a popular coding language (e.g., Java or Python) |

MTA is consistent with backward course design, an accepted model for effective course development (Daugherty, 2006; Wiggins & McTighe, 2005). Backward design starts with the instructor's ultimate goals—that is, the measurable learning outcomes that instructors want students to achieve by a course's end (Varela, 2017; Wolfson, Cavanagh, & Kraiger, 2014). In the second step, the instructor works backward to determine the assessments that will provide evidence that students have achieved the specified learning outcomes (Bonner, 2016; Riggio, 2003; Ungaretti, Thompson, Miller, & Peterson, 2015). In the final step, the instructor selects the curriculum and learning experiences that provide the necessary knowledge and skill development for students to successfully complete the assessments (Graff, 2011; Kelting-Gibson, 2005). Adopting MTA primarily affects the second stage of backward design—that is, assessment design. A course's learning outcomes provide significant insight into an instructor's priorities and goals: learning outcomes also drive the instructor to develop the assessment strategy, which includes determining the grading tiers.

Although the three courses all focus on technical knowledge, they differ significantly in their learning outcome strategy. The instructor for the database course feels all learning outcomes—entity-relationship diagrams, logical data modeling, and SQL—indicate a student's performance. We refer to this strategy as a "holistic strategy" in that the instructor expects students to achieve a minimal level of competence across all three outcomes. In contrast, the analytics class covers different and largely independent machine learning algorithms (e.g., decision trees, regression, clustering, and neural networks). The instructor for the course feels that, although students should ideally know all such algorithms, they could also opt out of some in return for a lower grade. Since students can choose how many outcomes they complete, we refer to this strategy as a "cafeteria strategy". Finally, in the Web development class, the concepts build on one another as the course proceeds through Web design, the integration of a relational database, and Web development. Later learning outcomes depend on the earlier ones. We deem this strategy a "hierarchical strategy". Instructors need to recognize these strategies because, in choosing grading design, they need to ensure not only that students can achieve the learning outcomes but also that the assessment design reinforces the outcome strategy.

Next, instructors need to design the grading tiers or bundles, which designate what students must complete to achieve that particular tier. Instructors should first consider major assignments since they address a significant portion of the learning outcomes (see Table 4). Relying on the major assignments as a primary criterion for final course grades also ensures that each grade has meaning and significantly differs from other course grades. Instructors should consider the desired minimum level of achievement required when designing the tiers. We should note that, in our program, students must earn a C or better in these three courses to qualify for graduation, so we have used the C tier as the minimum desired achievement level for graduation.

**Table 4. Tiered Assessment Structure**

| | Database course | Analytics course | Web development course |
|---|---|---|---|
| Major assignments | ERD exam<br>LDM exam<br>SQL exam | Project 1: foundational concepts<br>Project 2: regression<br>Project 3: decision trees<br>Project 4: neural networks<br>Research project | Exam: foundational concepts<br>Project 1: Web design<br>Project 2: database implementation<br>Project 3: Web development<br>Final project (team project) |
| Minor assignments | Class reflection papers | Four readiness quizzes | Team evaluation score<br>Three homework assignments<br>Three guest speakers from outside class |
| Outcome strategy | Holistic: students must achieve a minimum score across all exams to earn desired grade | Cafeteria: students can opt to complete more assignments to earn higher grades | Hierarchical: students can complete more assignments to earn higher grades, but they must complete them in order. Students can stop when they achieve their desired grade. |
| D tier | Earn 60% or higher on three exams | Complete one additional project from projects 2, 3, and 4 | Complete the foundational concepts exam<br>Complete project 1 and homework 1 |
| C tier: complete the D tier and… | Earn 70% or higher on all exams | Complete two additional projects from projects 2, 3, and 4 | Complete project 2 and homework 2 |
| B tier: complete the C tier and… | Earn 80% or higher on all exams | Complete projects 2, 3, and 4 | Complete project 3 and homework 3<br>Earn 3 out of 5 or better on peer evaluation scores |
| A Tier: complete the B tier and… | Earn 90% or higher on all exams<br>Complete the research project | Complete the research project | Complete the final project<br>Earn 4 out of 5 or better on peer evaluation scores |
| Plus or minus grade adjustments | Students who complete 7 or more class reflection papers will receive the plus version of the grading bundle. Students who complete less than 4 reflection papers will receive the minus version | Students who average 90% or higher on the quizzes will receive the plus version of the grading tier. Students who average below 80% will receive the minus version of the grading tier | Students who attend at least two guest speakers will receive the plus version of the grading tier. Attending none or one of the speakers qualifies the student for the minus version of the grading tier. |

The database course primarily assesses its learning outcomes using three exams, and each exam maps directly to the course learning outcomes and to the professional skills that students need to succeed. To reinforce the holistic strategy, the instructor requires a minimum score of 70 percent across all three exams to achieve a C in the course, an 80 percent or better on all exams to earn a B in the course, and a 90 percent or better on all exams to earn an A. This practice differs from partial credit since students cannot do well on one exam to make up a deficiency in another. The minor assignments then determine the score in the tier. The number of reflection papers that the student completes determines the plus/minus grades in the achieved tier.

In contrast, the analytics course has five projects as its major assignments: the second, third, and forth projects each contribute to a different learning outcome. Consistent with the cafeteria strategy, students can opt to complete fewer modules in return for a lower grade. The analytics class views the first project as required and foundational, so students need to complete it to pass the course. However, students can choose whether to complete the subsequent projects. Students who complete two additional projects complete the C tier and three additional projects complete the B tier. Students who want an A must complete the optional research project, which requires them to research a machine learning approach that the class does not cover, select an appropriate dataset, and complete and write up the analysis and findings. Students who score high on the readiness quizzes can earn a plus grade (e.g., D+, C+, B+, A+), while students who score poorly earn the respective minus grade.

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For the Web development course, the instructor uses a mixture of exams (for concepts) and projects (for skills). The Web development class uses a hierarchical outcome strategy—that is, that each major assignment builds on the previous outcomes. The initial exam focuses on general Internet concepts and terminology. All students must complete this foundational exam to pass the course. The first project focuses on Web design, which includes cascading style sheets, HTML, and Bootstrap. Students who complete this project qualify for the D tier. To complete the C tier, students must successfully design and implement a relational database, enter example data, and then display that data on their designed webpage. Students can complete the B tier by completing a Web development project in which they need to integrates business logic into the website (e.g., adding an item to a shopping cart, or searching the database for an entered value). The A tier requires self-directed student teams to design and implement a data-driven website for an e-commerce website that interests them: instructor forms the teams only from the students interested in pursuing an A, so the teams comprise highly motivated students. Students first submit a proposal for the website at midterm, which the instructor approves. Once approved, students work in teams to complete the A bundle. Given the importance of teamwork in this class, students must also earn a minimum score on their team evaluations to earn at least a B or an A. The number of guest speaker presentations the student attends determines plus and minus grades in the achieved tier.

A final—but critical—element to successfully implementing motivational tiered assessment involves establishing a clear revision policy, which incorporates greater formative assessment and enables iterative learning. Table 5 illustrates how MTA replaces partial credit with iteration to facilitate earlier feedback and to deepen student learning. In the database course, the instructor allows students to retake any exam one time so that they can achieve the designated minimum scores for the grading tiers. In the analytics course, each student receives four tokens at the start of the semester that the student can use to resubmit projects, drop a readiness quiz, and extend an assignment deadline by 48 hours. In the Web development course, students receive two tokens that they can use to resubmit any project without penalty. Given the learning outcomes' hierarchical nature, however, the instructor requires that students complete the projects in order. For example, they cannot complete the second project until they complete the first one. As a reward, students who have not used either token at the end of the semester can cash in both to replace one guest speaker obligation.

**Table 5. Revision Policies**

| | Database course | Analytics course | Web development course |
|---|---|---|---|
| Revision policy | The syllabus lists a designated makeup time for each exam. Students can retake all exams one time without penalty. | Students receive four tokens that they can use to:<br>• Resubmit a project that has received a pending score<br>• Drop one readiness quiz score<br>• Extend a project's due date by 48 hours | • Students receive two tokens that they can use only to resubmit a project.<br>• Students must complete a project before moving on to a subsequent project.<br>• Students can cash in two tokens at the end of the semester to replace one speaker obligation. |

Instructors need to ensure they can clearly communicate and implement any revision policy. Of course, instructors can choose whether to use tokens and how many they should use: more tokens, of course, will lead to more iterative learning but will also increase instructor workload. We suggest instructors carefully consider before courses begin as to what situations may arise and whether they would be comfortable with the outcome. Because iteration can effectively enable learning, however, instructors should seek ways to integrate revision and to encourage students to learn from their mistakes.

Collectively, these examples serve to illustrate how courses across the IS curriculum could implement MTA. While each course contains a different balance of theory-based, skills-based, or hybrid learning outcomes, each adapts MTA to provide a roadmap for each performance tier and to facilitate learning through iterative feedback and choice.

# 5 Conclusion

Grades have an impactful effect on student opportunities both from employers and from future university programs. Yet, as we illustrate in this paper, grades are often an amalgam of partial credit outcomes, which obfuscate student learning and achievement. Although using a points-based grading system does not necessarily contravene iterative learning, its punitive nature can discourage students from pushing themselves: hence, the approach per se negates its effectiveness as an iterative learning opportunity. As

such, students rarely have an opportunity to learn from their mistakes and incorporate instructor feedback. Students, faculty, and employers also observe that a points-based grading system has unclear expectations and competencies. As a result, IS programs (and academic programs in general) struggle to connect grades with specific levels of student performance.

Thus, we need to consider alternatives that improve student assessment, and MTA has several advantages over points-based grading approaches. We have found that MTA has had little effect on course evaluation scores for instructors who have integrated it into their classes, but final grades scores—especially in the number of higher grades awarded—have dropped. This finding indicates that students have opted into lower grades but also that MTA can help differentiate ability and mitigate grade inflation. We need more work to empirically confirm these trends. MTA improves the reliability and validity of grades as a way to measure student learning outcomes by reflecting students' true competence (Nilson, 2015). Although MTA remains rather new to IS and the larger business school curricula, many established certification programs reflect its underlying philosophy (e.g., Cisco, Microsoft), and more research on tiered approaches' advantages continues to emerge (Schimmer et al., 2018; Nilson, 2016).

MTA has several advantages, such as versatility and improve student accountability. Although we present only MIS course examples, to date, instructors have used MTA in accounting, management, finance, analytics, and even engineering courses. We have received very positive feedback from students, such as:

> *I love [MTA] and I wish more professors would implement it, especially in MISY classes that are very project based…. I found [MTA] to be useful. It allows students to have a clear understanding of what grade they desire to get*.

Negative comments have tended to address poor clarity in instructors' specifications and how much work students need to do to achieve higher grades. We continue to revise and improve the approach, which includes more deeply clarifying the specifications. Because we specifically focus on achieving greater differentiation among our students (and especially moving away from "an easy A"), we view the latter comment as somewhat inevitable.

To illustrate how instructors could integrate MTA into college courses, we discuss MTA, provide a theoretical basis for its effectiveness, and present how one could implement it across three IS courses. We demonstrate with the three course examples that an employer hiring the C-level student from an MTA-based course knows that the student has achieved a minimum competency (whatever the instructor sets the competency to be) in its entirety. The employer can also more easily differentiate those competencies with the competencies that an A-level student achieved. We also note that, under MTA, instructors can more easily adjust these tiered competencies year to year, which can increase IS programs' rigor and raise expectations in a systematic manner. Moreover, instructors can more easily track whether students have achieved learning goals, which most accreditation procedures require.

With this paper, we contribute to the prior literature on the pedagogical strategies in management and information systems. The prior literature tends to focus on the content of the learning outcome, specification, or competency. For example, some prior research has discussed strategies to balance theory and skills (Grant & Baden-Fuller, 2018). Instructors can apply MTA to a theory-based, skills-based, or hybrid approach to courses across IS and the broader business school curriculum. In doing so, they will focus on structuring the tiers to reliably measure whether students have achieved each learning outcome and to differentiate the different levels each student achieves.

MTA highlights several paths for future inquiry. For example, grade inflation possibly results not from instructors wanting to improve their student evaluation scores (as commonly assumed) but from altruistic gestures to individual students (e.g., extra credit, dropping test scores) to sustain and enhance perceptions about instructor supportiveness, student efficacy, perceived value, and, ultimately, student motivation. MTA eliminates this need since it allows instructors to adjust expectations at a *course* level rather than curving or making exceptions for individual students. Future research could assess the grade validity of courses that have implemented MTA and as to measure the individual traits (e.g., motivation) from an MTA course relative to course that relies on a points-based grading system. If MTA becomes more widely used, then empirical comparisons of GPA, employment, and other trends may be possible. In the interim, interpretative qualitative analysis through interviewing or surveying key stakeholders (e.g., students, faculty, and employers) could be a useful first step to identifying and measuring the value of motivational tiered assessment to IS and the professions they serve.

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