Metacognitive Matters: Assessing the High-Impact Practice of a General Education Capstone ePortfolio

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This manuscript describes the development, execution, and assessment of the University at Buffalo's instructional approach used to teach reflective and integrative learning skills through a general education capstone (i.e., UB Capstone). Early results of the impact of this experience are based on Capstone instructor rubric ratings of Capstone ePortfolios and student responses to an open-ended survey. These results suggest that students are producing high-quality ePortfolios that demonstrate their achievement of key general education learning outcomes, including integrative learning skills. In addition, based on student comments, it is clear that the Capstone experience has a metacognitive impact on student learning; the majority of students completing the Capstone recognize its benefits to their learning and continued growth as learners.

Capstones, or culminating educational experiences, have been used in higher education in the United States since the late 19th century (Hauhart & Grahe, 2015). Capstone experiences are referred to by many different names (e.g., senior thesis, culminating project, senior exhibition), but the purpose remains the same: to provide a guided educational experience where student learning develops into an integrated whole that can be applied easily both to future learning scenarios and out-of-classroom situations (Cuseo, 1998). The general education Capstone at the University at Buffalo is designed to foster integration of the general education experience and application of general education skills to coursework in the major. In this paper, we provide initial evidence of the impact of this general education capstone on integrative learning.

The UB Capstone, first described in Morreale, Van Zile-Tamsen, Emerson, and Herzog (2017), is a major component of the newly revised general education program launched in fall 2016. Known as the UB Curriculum, it transformed general education at UB from the traditional "menu" approach of distributional requirements to an integrated and meaningful Pathway approach. Pathways provide a breadth of knowledge by allowing students to study a topic of interest from multiple disciplinary perspectives. The capstone is the final requirement in which students reflect on and integrate the knowledge they have gained from their Pathways. Students prepare a Capstone ePortfolio to highlight the knowledge and skills developed across the UB curriculum.

The development of the UB Curriculum (described in detail in Van Zile-Tamsen, Hanypsiak, Hallman, Cusker, & Stott, 2017) was faculty-driven and grounded in the work of the Association of American Colleges and Universities (AAC&U) around the design of a liberal education for meaningful, worthwhile learning. It also incorporates high-impact practices (HIPs), evidence-based educational practices that promote college student persistence, learning, and success (Kuh, 2008). The UB Curriculum begins with a first-year seminar, taught by full-time, tenure-track faculty, and concludes with the UB Capstone. Reflective ePortfolios, formally recognized as the eleventh HIP (Watson, Kuh, Rhodes, Light, & Chen, 2016), are introduced in the first-year seminar and provide the mechanism for reflection and integration in the UB Capstone. As the design of this program is described in detail in Van Zile-Tamsen, et al. (2017), the focus in the present paper is to describe the evolution of the capstone from the pilot phase (Morreale et al., 2017) to its present format and to examine the initial evidence of impact.

Literature Review

The UB Curriculum Capstone is the culminating course in the University at Buffalo's redesigned general education curriculum. The general education program redesign includes greater intentionality in coursework offerings and incorporates two of Schneider's (2004) proposed pillars of liberal learning: inquiry and intellectual judgment and integrative learning. The capstone serves as the mechanism through which active integration of general education coursework takes place. The overall objective is to help students develop an integrated, interdisciplinary knowledge base that can be transferred to new situations and more readily available for problem solving and critical thinking activities (Mentkowsky & Sharkey, 2011; University at Buffalo, 2013).

The Nature and Importance of Integrative Learning

Integrative learning has been referred to as an intentionally designed sequence of courses, and as a cognitive process where students actively build connections between topics, courses, disciplines, etc. (Leonard, 2012). Constructivist theory (Bruner, 1996) suggests that merely sequencing related courses in a particular way does not ensure that the cognitive press occurs. Instead, students must be given guided practice

in the process of making such connections across content areas, and they must be motivated to engage in the effort that this cognitive process requires.

Leonard (2012) suggested that integrative learning processes can be arranged along a continuum from basic to sophisticated: application, comparison, understanding context, and synthesis. Further, the design of the learning environment impacts the level of integration that occurs. Specifically, learning activities that include personally relevant coursework, identifying multiple perspectives, encountering conflict, and reconciling conflict promote the cognitive processes underlying integration. However, Leonard (2012) also cautioned that college students' ability to engage in integration parallels their cognitive development; integration improves as students develop their own definitions of knowledge and become independent knowers (Baxter Magolda, 1999).

Huber, Hutchings, and Gale (2005) agreed that integrative learning does not just happen. Not only must students have intentionality and self-awareness in their own learning, but instruction must be delivered in a way that provides scaffolded integration opportunities. Even motivated students will compartmentalize their learning if courses are delivered as discrete chunks with no opportunities to make cross-course connections.

Using the Capstone ePortfolio as the Mechanism of Integration

By design, a capstone is a logical place to support students' integrative work (Hauhart & Grahe, 2015). The general education capstone at the University at Buffalo is designed to foster integration of the whole general education experience and application of general education skills to coursework in the major. While there can be many approaches to integration and integrative learning, at UB, the ePortfolio has become the signature capstone assignment, promoting a scaffolded approach to reflection and intentional integration (Reynolds & Patton, 2014). The ePortfolio becomes the mechanism for integration, ensuring that the connections students make between their general education experience and the skills they have gained through that learning are visible.

Pathways and the UB Curriculum Capstone

The UB Capstone is where students learn to integrate knowledge across courses and experiences to develop a deeper and more meaningful knowledge base. This knowledge is acquired through completion of UB Curriculum requirements, particularly the Pathways courses. Students take two pathways: (a) Thematic Pathway and (b) Global Pathway. These pathways have

been designed to allow students to pursue the disciplinary areas required by the State University of New York (SUNY) for general education.

Students begin by first selecting from a variety of overarching topic areas within each pathway (e.g., business, economy, society). Once they select a topic, they are given lists of courses at the 100-level, 200-level, and 300-level that represent arts, civilization and history, language, humanities, and social sciences. Each pathway must include courses from two of these disciplinary areas. Through the structure of the pathways from broad introductory courses to more focused courses, students reflect upon their education as a continuum rather than a set of discrete courses and deepen their understanding of academic material by examining a single topic across several courses from different disciplinary lenses. Integration of course work, however, is something that requires time and space for reflection and motivation to engage in the integrative metacognitive process (Mentkowski & Sharkey, 2011).

The UB Capstone subsequently provides this time and space as well as guidance in the integration process. Students take the capstone once they have completed all UB Curriculum requirements. Students are also permitted to take the capstone in the same semester that they are enrolled in their final UB Curriculum courses. The typical student will enroll in the capstone course in the second semester of their junior year. The capstone course is taught online via the ePortfolio platform Digication (branded "UBPortfolio") by trained faculty and instructors who serve as mentors to enrolled students as they complete the Capstone ePortfolio.

Evolution of the UB Capstone

The Capstone pilot was launched in spring 2016 with an enrollment of 21 students (Morreale et al., 2017). The focus of the pilot was the ability for the students to successfully engage with the Digication ePortfolio software, developing a schedule for feedback from the instructor to the students, and the course's composition as a 1-credit hour, online-only class. In successive years, changes have been made to the course to accommodate and better match the learning outcomes as the capstone has approached full-scale implementation. For instance, although the course is delivered online, a 90-minute in-person orientation was developed to provide an introduction to the course, familiarize students with their instructors and class expectations, and acclimate them to Digication. Further modifications have been made to assignments to better align with the 1-credit hour mandate and to ensure equity across sections.

These changes have been paired with deliberate efforts by the UB Curriculum office to provide outreach to faculty regarding both the Capstone, Digication, and

Table 1
Capstone Enrollment From Pilot Through Implementation

Term	Classification	Enrollment	Instructors	Sections	Avg. students per section
Spring 2016	Pilot	21	1	1	21
Spring 2017	Launch (transfer students)	53	7	7	8
Summer 2017	Pilot of New Digication	9	1	1	9
Fall 2017	Continuation	79	8	8	10
Winter 2018	Repeaters only	9	1	1	9
Spring 2018	Scale up	501	9	19	26
Summer 2018	10-week session	59	1	3	20
Fall 2018	First group of eligible first-time students	570	14	28	20
Spring 2019	Scale up	1296	19	56	23

guidelines for encouraging students to archive their work. For students, Digication is introduced in the UB Seminar, and they are tasked with locating and preserving artifacts (i.e., representative coursework) from each UB Curriculum course to showcase in the capstone. These outreach efforts have brought considerable benefits to both students and instructors since students begin the course already familiar with the capstone expectation and the procedural basics of Digication and ePortfolios. Beginning in spring 2019, the capstone scaled up as more students became eligible for the course than ever before. Table 1 displays enrollment growth from the pilot to spring 2019.

Learning Outcomes and Assignments

There are six learning outcomes for the UB Capstone which are assessed through weekly assignments and the final Capstone ePortfolio. Upon completion of the UB Capstone, students will be able to: (a) articulate connections across different academic disciplines and perspectives; (b) adapt and apply skills, abilities, theories, or methodologies acquired in one situation to new situations; (c) connect relevant experiences and academic knowledge; (d) demonstrate an evolving sense of self as learner; (e) integrate different forms of communication to enhance meaning (prose, sound, visual media); and (f) apply an understanding of digital citizenship to create an academic capstone portfolio. A course rubric based on these learning outcomes is the measure by which the final ePortfolio is evaluated (available from the first author by request).

Weekly assignments correspond with components of the final ePortfolio:

- A personalized home page that serves as a brief introduction to the student, his or her studies, general interests, and career goals.

- A learning philosophy statement which serves as a critical reflection upon the self as learner and how a student has evolved or changed as a learner during his or her tenure at UB.
- A showcase of UB Curriculum artifacts where a student provides representative coursework, explains its relevance, and justifies selection of the specific artifact.
- Two pages devoted to "beyond the classroom" activities (e.g., engagement with the arts, community volunteer work, internships, club and athletic activities, alternate break or study abroad experiences) where students connect learning that occurs inside and outside of the classroom.
- Two reflective essays, one focusing on the Thematic Pathway and the other on the Global Pathway. This culminating section of the capstone demands a rigorous application of integrative thought, asking students to examine a complex issue from multiple theoretical perspectives or to adapt and apply skills to solve a complex problem.

Instruction

Instructional staffing in the most recent semester included one capstone clinical instructor, 10 teaching assistants, and eight adjunct instructors (i.e., internal, extra-service candidates serving full-time in other departments on campus). Each teaching assistant and adjunct instructor was responsible for two sections (up to 66 students) of the UB Curriculum Capstone course. Students in each section were from a variety of majors. The instructor served as a mentor and facilitator in helping students to conceptualize and construct a holistic, reflective ePortfolio. The facilitation of integrative learning and reflective writing was paramount. Students were encouraged to consider the

ePortfolio as a comprehensive reflection of their learning across not only general education coursework but throughout their entire lives—students recalled relevant experiences, skills acquired, and challenges faced both within and beyond the UB curriculum.

The capstone has been increasingly standardized to provide greater equity across sections. Standardized elements include a uniform schedule, weekly outreach messages to students, portfolio guides, and instructional materials. The implementation of a standardized course coupled with the creation of a repository of instructor information and additional materials has greatly reduced the overhead for instructors. With the course's exponential growth, these initiatives free instructors to focus on ePortfolio feedback and mentoring activities.

As the capstone has evolved, an emphasis has been placed on diversifying the disciplinary specialties of the instructors to better reflect the student body. Instructors now hail from a variety of majors, such as comparative literature, curriculum and instruction, English, foreign and second language education, history, linguistics, media study, mental health counseling, nursing, and social work. The nature of the Capstone affords instructors the unique opportunity to engage with students from each and every major offered at UB.

Training

Capstone instructors are selected based on demonstrable teaching skills in online environments. Their training emphasizes a mastery of Digication, which allows them to adeptly field technical questions and issues. The pedagogical emphasis is on efficacy in student engagement. Members from various support units (e.g., the Teaching and Learning Center and University Libraries) provide specialized training to instructors in the weeks prior to the beginning of the semester. These specialized trainings focus on deepening the instructors' pedagogical knowledge in online teaching as well as anticipating issues that arise in the ePortfolio (e.g., digital copyright and academic integrity). Instructors are familiarized with the standardized rubrics for each assignment as part of the training, including a discussion of how rubrics are tied to the learning outcomes. Capstone instructors meet on a biweekly basis where discussion about upcoming assignments is the focal point. In particular, model examples of student work from previous semesters helps establish a baseline for consistent grading across sections. An anthology of best practices containing feedback from previous capstone instructors is updated after each academic year, and this document is disseminated to new instructors to aid them in the day-to-day operations of the capstone. Annual evaluations are conducted at the end of each academic year to gauge

areas of strength and weakness for each instructor, and to promote their professional development.

ePortfolio Template

An ePortfolio template has been created to provide students with a basic structure for the successful construction of the final ePortfolio. The template is preloaded with prompts, instructional content, and other information to assist the student in both the technical and substantive generation of their ePortfolio and its content. Students are required to customize the ePortfolio template while keeping an eye toward accessibility and readability. They are also required to demonstrate multimodal communication—their ability to integrate design features with the message of their textual content to reinforce and amplify that message. The Digication platform has an almost limitless capacity for importing content of virtually any type, and thus students may personalize their ePortfolios to suit their preferences.

Employability Skills

The original UB Capstone design committee incorporated goals related to student benefits that transcend the stated learning outcomes of the course. In particular, students are encouraged to consider the value of reflection and the insights shared in the process of constructing their ePortfolios in order to highlight marketable skills acquired as part of their general education. The portability of the Digication platform allows students to retain control over their data in perpetuity. Students are encouraged to either adapt their Capstone ePortfolios or to develop a tailored ePortfolio for the job market. The transferable skills they acquire through a quality general education provide them with considerable flexibility in their employment potential, and the ePortfolio is promoted as an ideal method for recent graduates to demonstrate these skills. Similarly, the reflective, integrative learning accomplished through the Capstone ePortfolio provides students with an excellent platform to build upon for application to graduate schools, grants, and fellowships.

Transfer-Specific Issues

One particular area of attention has been the transfer student experience in the capstone (and, more generally, throughout the UB Curriculum). Many of our transfer students are high-credit transfer students. A deliberate effort has been made to make sure transfer students felt the course was relevant to their unique experiences, just as much as it would be to a first-time UB student. Another issue for transfer students is that coursework may have been completed many years prior to

enrollment at UB. As a result, specific recall of coursework and its details can prove difficult. At the end of the day, not every course may prove meaningful nor may every student have total recall of their time in that particular class. It does not diminish the value of the exercise, and collectively, students are able to holistically reflect on their general education coursework.

Assessing the Impact of the UB Capstone on Student Growth and Achievement

The capstone was designed with the very specific purpose of fostering reflection and integration of the general education learning experience, and it is necessary to examine both objective data regarding students' achievement of these learning outcomes and their perceptions of the impact of the capstone experience on their learning. To understand the degree to which the goals of the capstone have been achieved, we examined student achievement data based on rubric scoring of their Capstone ePortfolios. We also measured student perceptions of the capstone experience as expressed in an open-ended survey to determine if the level of desired integrative learning and self-reflection was evident in their work.

Method

UB is the largest, most comprehensive institution in the SUNY system and a member of the Association of American Universities (AAU). UB currently enrolls 21,000 undergraduates in over 100 degree programs. The undergraduate population consists largely of students studying in STEM or the health sciences and is 56.7% male and 43.3% White. Based on the 2017-18 Common Data Set (University at Buffalo, 2017), the four-year graduation rate was 58%, and the first- to second-year retention rate was 86%. Although there have been gains in the four-year graduation rate over the last 10 years, the retention rate has remained fairly constant.

Rubric results were compiled for the 502 students enrolled in the UB Capstone in spring 2019. Of these students, 49.0% were female and 92.0% were domestic students. Of the domestic students, 25.5% were from underrepresented groups: 12.6% African American, 5.8% Hispanic, and 1.0% Native American/Alaskan Native. At the university, Asian students are not considered underrepresented and comprised 12.6% of the domestic students enrolled in the Capstone. Of the 38 international students, 26.3% hailed from China, 21.2% from India, 15.8% from South Korea, 7.9% from Taiwan, 5.3% each from Japan and Hong Kong, and 2.6% each from the Czech Republic, Jordan, Kenya, Malaysia, Myanmar, Norway, and Turkey.

The majority of students enrolled in the Capstone in spring 2019 were transfer students (79.3%). Of the

remaining students, 18.9% enrolled at UB as first-time freshmen and 1.8% were re-enter students (i.e., those who had been enrolled at UB previously, left for some time, and then returned). Nearly a quarter of the students (21.9%) were first-generation students. A small number of these students (3.2%) were enrolled in the Educational Opportunity Program (EOP), 5.4% were in the Honors College, and 2.4% were athletes. With regard to final grades in the capstone course, 81.5% received grades of A or B, 9.0% received C grades, 4.4% received D grades, and the remaining 4.6% failed or resigned from the course. Most were enrolled in the capstone as seniors (77.3%) while 20.5% were juniors and 2.2% were sophomores. The anonymous open-ended survey was completed by 109 of the enrolled students (21.7%).

Data Collection and Analysis Procedures

Throughout spring semester, students completed their Capstone ePortfolios in Digication. At the end of the semester, they used Digication to submit their final ePortfolios. The instructors used the common rubric to score submitted ePortfolios according to the achievement of each of the course learning outcomes. These rubric scores reflect the objective measure of student achievement of the capstone learning outcomes. The achievement levels for each rubric row (e.g., each learning outcome) were as follows: 0 (*no evidence*), 1 (*emergent*), 2 (*proficient*), 3 (*fully competent*), 4 (*exemplary achievement*). All rubric scores were exported from Digication and summarized using SPSS. The results for the first three learning outcomes relating specifically to integrative learning and developing as a learner are presented in this paper.

Students' perceptions of the impact of the capstone on their learning were collected via an open-ended online survey. At the end of the spring semester, e-mail invitations were sent to all students enrolled in the capstone requesting that they complete the survey. Students were informed that the purpose of the survey was for assessment of the capstone and the results would be completely anonymous and used only to help improve the capstone experience. The survey itself consisted of five items, but only data from three are analyzed in this study:

- What have you learned about yourself as a learner through your experience in the Capstone?
- Describe any new understandings you have developed about general education courses you have taken through your completion of the Capstone ePortfolio.
- What do you see as the most valuable part of general education coursework?

Qualitative data analysis of responses to these three questions follows the steps provided by Van Zile-Tamsen (2011). The data was initially output to an Excel workbook and separated by survey question into separate tabs. Within each tab, responses were sorted alphabetically by the first word of the response to facilitate coding of like responses. In this manner, all of the "N/A," "everything," and "nothing" responses were easily grouped. After an initial read-through of all responses, an investigator assigned themes to responses (Gibbs, 2007). In some cases, the response represented a single idea, but in other cases, responses were more complex and referenced two or more discrete concepts with multiple themes assigned.

Once initial coding was complete, the second investigator reviewed all coding to indicate agreement/disagreement with initial themes. In cases where there was disagreement, the two investigators discussed responses until they came to consensus regarding the most appropriate theme or themes (Flick, 2007). Once all disagreements were resolved, higher-order theme analysis was completed and the results were organized into tables (Miles & Huberman, 1993).

Results and Discussion

Table 2 provides the results of the rubric scoring of ePortfolios, which show that the enrolled students are successfully achieving the learning outcomes of the course. This rubric is based largely on AAC&U's (2009) Integrative and Applied Learning VALUE Rubric, while being tailored to the specific outcomes relevant to the UBC399 Capstone. The first outcome, articulate connections across academic disciplines and perspectives, specifically addresses integrative learning.

The results of the rubric scoring of final ePortfolios are very encouraging, with 78.7% of spring 2019 capstone students categorized as fully competent or exemplary. Further, 81.8% of the students were fully competent at connecting relevant experiences and academic knowledge. This suggests that these students gained skills in the area of transferring knowledge from one situation to another, often between out-of-classroom experiences and things they learned in coursework.

The results of the theme analysis for Item 1, "What have you learned about yourself as a learner through your experience in the Capstone?", are shown in Table 3. Of the 109 students who responded to this item, 84 (81.0%) indicated that they learned something, while 24 (19.0%), indicated that they learned nothing and the capstone was either meaningless or a waste of time. The 84 students who indicated that they learned something generated 122 discrete comments to describe what they learned, which were separated into three overall themes of learning: learned about myself (68 comments; 56% of the total 122 comments generated); learned about the educational process (26 comments for 21% of the total 122 comments); and the capstone structure itself had an impact (28 comments for 23% of the total 122 comments).

Much of the feedback regarding the capstone highlighted previously unrecognized course connections (29%). The UB Curriculum is designed to curate experiences across disciplines—particularly in the pathways component of the curriculum—where coursework is organized along particular themes. Students have the freedom to select pathways topics that are of interest to them; the courses are not tied to their major. The pathways encourage students to examine big ideas (e.g., business, economy, and society; human nature; social justice) in the capstone, completing integrative essays that prompt students to identify and determine the significance of these connections. Instructors are not tasked with highlighting these connections in their courses, but rather, these ideas emerge organically.

Table 2

Achievement of Course Learning Outcomes (Percentages of Rubric Scores)

Learning outcome	Not submitted	No evidence	Emerging	Proficient	Fully competent	Exemplary
Articulate connections across different academic disciplines and perspectives.	4.0	0.2	11.6	5.4	19.7	59.0
Connect relevant experiences and academic knowledge.	4.0	0.2	10.6	3.4	16.1	65.7
Demonstrate an evolving sense of self as learner.	4.0	0.2	11.4	4.8	17.9	61.6

Table 3
What Students Have Learned

Theme	Sub-theme	Exemplars
Capstone had impact (28, 23%)	Fostered course connections (8, 29%) Self-reflection (8, 29%) Writing skills (3, 11%) Learning skills (3, 11%) Professional development (2, 7%) Critical thinking (1, 4%) Intellectual diversity (1, 4%) Digital citizenship (1, 4%) Technological literacy (1, 4%)	"I've learned that I can make connections between things that are seemingly unrelated. I also learned to become a better writer by making those connections and tying ideas together" "How to investigate presented facts' authenticity and how to build on and show my experience across courses through resumes and portfolios." "I have gone through all my past courses and that has given me ideas on what to put on my resume."
Learned about myself (68, 56%)	Metacognitive awareness (29, 43%) Evolution of self as a learner (22, 33%) Learning skills (5, 7%) Importance of effort (4, 6%) Fostered course connections (3, 4%) Intellectual diversity (1, 2%) Role of creativity (1, 2%) Support systems (1, 2%) Digital citizenship (1, 2%)	"I have reflected upon all of the skills and techniques that I have harnessed and used through my career." "As A [*sic*] learner, I noticed that I should take more time to consider things other than assignments and exams and note the importance of digital citizenship." "I have learned that I have evolved tremendously as a learner throughout the years. My study habits, note-taking and listening skills have all changed for the better and I can really see that by completing capstone."
Learned about education (26, 21%)	Developed course connections (14, 54%)	"That all of the classes that I have taken all have seemed very different, but . . . I saw just how interconnected everything is to each other." "I have learned that all my classes . . . have helped me to further develop my studies as a student. I have always enjoyed learning but having the ability to reflect on everything I have learned . . . enabled me to appreciate everything I have . . . learned these last 2 years."

Students also engage in self-reflection as a result of the capstone (also at a rate of 29% of respondents). In some cases, students utilize the capstone as a means of assessing their prior coursework as it relates to their fitness for entering the job market. While these types of practical connections are not discouraged, the capstone strives for deliberate metacognitive growth, where students are examining transferable skills acquired across the general education curriculum. Feedback touching on the discernment of authenticity stands out for this very reason: no specific course may have explicitly addressed this concept, yet the student has added this concept to their toolbox and recognized its presence as a result of the capstone.

This leads to the second category: learned about myself. This metacognitive awareness of transferable skills is not a given. While many students may feel comfortable engaging with their academic discipline, it is of greater significance to UB Curriculum that graduates are emerging as well-rounded individuals who have acquired meaningful skills beyond their chosen discipline. The goal of the UB Curriculum—and any general education worth its salt—must be to produce these types of graduates, and it appears that the capstone has confirmed our students are learning about themselves in significant ways.

The final category of responses was that students learned about their education. While the first two categories of responses dealt with metacognitive skills,

responses to this question were oriented more closely to the value of the general education program as a whole. Interconnectivity is placed very highly amongst the exemplars (54%), but the value of the coursework itself (31%) is a remarkable and pleasing development. Since we know that many students are inclined to consider their general education coursework as mere requirements to be completed, this feedback informs us of the inherent value to students of general education coursework itself, as well as the efficacy of UB Curriculum's uniquely curated program.

The results of the theme analysis for Item 2, "Describe any new understandings you have developed about general education courses you have taken (and your learning in those courses) through your completion of the Capstone ePortfolio", are shown in Table 4. Of the 100 students responding to this item, 71 (71.0%) indicated that they had learned something, while 29 (29.0%), indicated that they learned nothing. The 71 students who indicated that they had learned something generated 93 discrete comments to describe what they had learned. Of these 71, five students indicated that the benefits they identified were completely unexpected. The themes that emerged from these comments are shown in Table 4.

Identification of course connections was an essential element for these respondents. Assignments throughout the capstone are intended to foster these connections. First, students identify representative coursework (i.e., artifacts) from each of their pathways courses. These artifacts are accompanied by criteria statements that detail the purpose and nature of the artifact and its larger significance. Then, students compose two integrative essays that require them to identify any connections—or disconnections—between their pathways courses. Where general education coursework might seem incongruent in a traditional model, in the UB Capstone, student essays consistently articulate the combined relevance of their Pathways courses in ways that make the classes significantly more meaningful.

Another portion of the integrative learning essays—and the larger ePortfolio—is to identify applicable, transferable skills gained throughout the pathways coursework. A total of 24% of our respondents indicated they were able to identify learning skills and strategies through the completion of the Capstone ePortfolio. Again, removing the idea of general education coursework from the realm of the incongruous into a more cohesive collection of substantive courses is imperative in the UB Curriculum. Evidence that students identified valuable skills (e.g., argumentative writing, source evaluation and discernment, time management) across the UB Curriculum is validation for the program's efficacy. A total of 15% of respondents indicated that building a knowledge base was a learning benefit of the capstone. A total of 13% responded with building transferable skills, which further suggests that the capstone helped students to engage in valuable metacognitive exercises relevant to their futures. Recognition of their qualifications and talents is vital for students in their pursuit of relevant opportunities.

The results of the theme analysis for Item 3, "What do you see as the most valuable part of your general education course work (those taken at UB and at other institutions)?", are shown in Table 5. Of the 101 students who responded to this item, 84 (83.0%) identified at least one valuable aspect of their general education programs and 17 (17.0%) indicated that there was no value. The 84 students who provided at least one aspect generated 116 discrete comments. Please note that because so many identified themes emerged for this question, only those with a frequency of 5% or greater are included in the Table 5.

With the capstone's emphasis on reflection, it is gratifying to see that the most frequent response centered on recognition of broadened interests and perspectives. Construction of an ePortfolio allows students to look back on their coursework and apply it moving forward. This metacognitive exercise helps students recognize the inherent value of their general education courses but also informs us on the efficacy of those courses toward imparting a strong foundation of intellectual diversity and appreciation in UB students. Similarly, in assessing the courses which make up the UB Curriculum, the quality of general education should also be measured based upon the ways in which the courses prepare students for real world applications both within and beyond their majors: 16% of respondents felt that the UB Curriculum provided them with foundational knowledge they could build on through their major courses. Acquisition of foundational skills (10%) was also a common theme. The UB Curriculum's deliberate grouping of foundations coursework, courses in communication literacy, math and scientific literacy, and diversity learning, appeared to help students distill transferable skills.

Another remarkable category was the development of learning strategies throughout UB Curriculum coursework. In the Capstone, while all of the assignments engage students in reflection, one particular assignment focuses on learning strategies, the Learning Philosophy Statement. Students reflect in 500 or more words to analyze the ways in which they learn, their ideal learning conditions, the evolution of their learning over time, and the implications for 21st century technology on their learning. Often students choose to deliberately examine their experiences in the UB Curriculum itself, while others take a broader approach by delving into their learning since early childhood and extending to their present-day

Table 4
New Understandings of General Education

Theme	Exemplars
Better understanding of the curriculum (5, 5%)	"It allows me to acquire different learning experiences and knowledge, and it helps my ability to think clearly, speak and write effectively, and act wisely."
Building a knowledge base (14, 15%)	
Building transferable skills (12, 13%)	"I have been able to understand the importance of taking classes unrelated to my major. Not only have I learned about things such as diversity and perspective taking but I have also developed a new approach to learning. General education courses provide me a variety of approaches to different world views on things such as English, math, and art."
Developing connections between courses (26, 28%)	
Developing learning skills and strategies (22, 24%)	
Diversity learning (9, 10%)	"I used to think general education courses were fillers just to take and earn credits towards your degree, but now I understand the purpose of them. Which is to broaden your communication and general scope through the arts and sciences."
Fun/enjoyable (3, 3%)	

Table 5
Most Valuable Part of General Education Course Work

Theme	Exemplars
Broadening of interests and perspectives (23, 20%)	"The most valuable part that I have seen is my knowledge and understanding of those general education topics. I need to keep an open mind and learn as much as I can even though it is not in my concentrated field of study."
Foundational knowledge (19, 16%)	"The most valuable part of my general education coursework was that it prepared me for my coursework in my degree's area."
Foundational skills (12, 10%)	"The most valuable part is the expansion of my knowledge. Various courses provided a wide range of concepts, and these concepts built the foundation for me as a learner."
Applied learning (11, 9%)	"Many of these courses relate to the current issues. For instance, my global gender study class talks about the negative effects of current global integration. So, these courses help me become more aware of the current world issues."
Development of learning strategies (9, 8%)	"The seminar class I took was a very important class because the instructor had a very distinct perspective on learning. This made me stretch some muscles which I would've never used in high school."
Intercourse connections and connections to major (8, 7%)	"The most valuable classes I have taken are the ones that overlap with my major requirements."

methodologies. Students also consider the evolution of learning from their childhood experiences to classrooms which feature the inclusion of technology. Resulting reflections often include the varied quality of information available from internet sources and the importance of solid research skills.

Conclusions

Based on students' achievement of the capstone learning outcomes as measured by instructor-completed rubrics, results suggest that students engaged in the desired level of integrative learning. They created a broader and more in-depth understanding of their selected pathways' topics through the exploration of course connections in their Pathways Essays. Student ePortfolios also provided evidence that UB students related events and situations outside of the classroom to things they learned in the classroom. The ability to transfer learning suggests that they will be well-positioned upon graduating from their academic programs to enter the workforce or apply to graduate study. Based on their comments to the open-ended survey items, students recognized the development of their integrative learning skills as well as the ability to transfer knowledge and skills across situations.

Summary of Progress

The capstone—and the redesigned UB Curriculum—represents a sea change in the conceptualization of undergraduate general education. By leveraging the high-impact practices of integrative and reflective learning alongside the ePortfolio, purposeful general education promoting successful outcomes independent of major, discipline, or career path is achieved. The capstone has evolved from a fledgling requirement available only to high-credit transfer students into a scaled course that expects an enrollment of over 1,300 students per semester. The feedback received from students has helped the capstone evolve into a more meaningful and accessible course for students from all majors. Assessment data indicate that the capstone is indeed fulfilling its goal of integrative and reflective learning, and that students gain an appreciation for both general education as a whole and the transferable skills that they have acquired.

Recommendations for Improvement

As the course continues to grow in size, it is essential that the quality of instructional staff of the capstone be maintained. So far, we have drawn from a large pool of graduate students and current UB faculty and staff to teach the capstone. The capstone has

gradually become a familiar concept to the larger UB community, making it appealing to potential instructors as a unique teaching opportunity. It does require specific pedagogical skills, however, and it will be important to maintain instructional quality.

Another topic for exploration is the delivery of feedback and, in particular, managing the workload for the instructors. Current projections have the section sizes enlarging to 100 students, rendering the current feedback model burdensome for instructors and well beyond the expectations of a 1-credit hour course. The streamlining of the course has helped ease the workload thus far. Alternative feedback models (e.g., greater usage of peer feedback) are being considered. Pilots in this vein are planned for future capstone sections.

One point of attention has been the number of respondents who indicated they found no learning benefit from the course. Given the reflective nature of the course, some students may not be able to recognize these benefits until some time has passed and they enter into the next phase of their lives, be it graduate school or entering the professional world. At 1-credit hour with a modality focused more on mentoring than on instructing, this seems like an expected (though not acceptable) rate of students. Many students arrive at the capstone feeling as if they are uncertain about the course and its purpose; by the completion of the course, their reflective writing indicates that they have indeed identified (if not recognized outright) the capstone's value. In revising the course, we have focused our attention on greater outreach to students prior to the course (in the other components of the UB Curriculum) to better prepare them for the class. We have also focused our attention during the course, making sure to describe the relevance of each assignment as it relates to their experiences and focusing on the integrative idea behind the UB Curriculum as a whole.

As the capstone continues to advance to scale, additional ways of satisfying the learning outcomes of the course beyond reflective writing should be explored. This is not to say that reflective writing must be eliminated; it is an essential element of the ePortfolio concept and what makes it invaluable. However, with students of all majors, disciplines, academic and professional trajectories required to complete the course, opening up the Capstone ePortfolio to the full multimodal potential of the platform will expand the opportunity for reflection. For example, a student in media studies may demonstrate reflective and integrative learning utilizing a short film as an alternative to a formal essay.

Orientation to Digication also needs to be reviewed. The initial approach has been to provide in-person orientations during the first week of the semester. This was necessary as the software, while

largely intuitive, had proven to be a common stumbling block for students who had never used it. With the course enrollment expected to double from the Spring 2019 to Fall 2019, a revised delivery model must be implemented to help acclimate students to the unique aspects of the capstone and set them on the correct path to using the software reliably.

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