Demonstrating Graduation Readiness Using Capstone Projects in a Rural School District

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Despite having engaged in capstone projects as demonstrations of graduation readiness since 2018-19, Osprey High School (OHS)[1] and the Osprey School District (OSD) leaders and educators continuously seek ways to improve the capstone experience for students each year. In this rural school district where roughly half of the students are eligible for free and reduced priced lunch (FRL), students gain experience each year to build up knowledge and skills that culminate with the presentation of the capstone project during their senior year. According to the school leader, the COVID-19 health pandemic affirmed the importance of the school's decision to go down the "capstone for all" route beginning in 2020-21. This marked a policy shift that required every student to fulfill capstone projects as a requisite part of fulfilling graduation requirements. As noted by the school leader, as more grade 11 students continue to opt out from taking the SATs, the district and the school see the potential of the capstone projects to provide more robust and relevant authentic learning experiences for students.

General Structure to the Capstone Process

At OSH, students gain initial exposure to the capstone process in grade 9. Incoming grade 9 students are assigned a capstone advisor, and this person remains as an advisor and mentor for students throughout their tenure in high school. Students can switch advisors if requested, but the primary reason to pair a long-term advisor with a student is to ensure that there is a consistent and supportive relationship established with at least one adult during the duration of a student's time in high school. In their freshman year, students work with advisors to select a pathway or a concentration (e.g., Health and Business or Skilled Trades, Security and Industry) for their studies, and to select a topic connected to their pathways or to their future interests for a capstone project. For example, a guiding prompt used to consider topic selection for a capstone project include: Contemplate all areas of interest in your life. *Where do you see yourself in ten years? Where do you see your project in relation to one or any of the ideas listed below?* The highlighted list includes areas such as social studies (historical study, cultural study), math and science (starting a tutoring program after school, pursuing an ozone study or starting a recycling program).

Transitioning from grade 9 to grade 10, students move into capstone sessions that focus on building applied research skills. The focus on research involves having students undertake an in-depth study of the chosen topic of interest. This study typically culminates with a finished research paper, report, or other type of deliverable (e.g., a product) that is intended to fulfill key requirements around demonstrated capacity to apply learned research skills. Moving from grade 10 to grade 11, students enroll into a year-long capstone course that requires them to engage in a sustained investigation of their selected capstone topic. Based on learnings or findings and artifacts collected from this sustained inquiry completed during their junior year, students spend the fall semester as seniors building a final presentation or demonstration of learning based on the capstone project that they have been working on since their freshman year. These demonstrations of learning are presented to the community in December of each year, with opportunities for students with capstone scores above a given threshold rating to compete in the spring for a scholarship.

Since the first year (2020-21) that the capstone process became a graduation requirement for all students,

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[1] All school and district names that appear in this brief are pseudonyms applied to protect the confidentiality of individuals.

the school understood the importance of establishing clearer standards and curriculum for meeting capstone expectations for both students and educators. The curriculum outlines expectations for both students and educators from grades 9 through 12. The culminating performance demonstration or assessment presented by seniors is rated by three individuals (the capstone advisor, another educator, and a community-based mentor) using a three-point rubric designed by the school. Scores on this rubric are then used to identify which students may need remediation prior to graduating. These scores are also used to identify which seniors are eligible to compete for scholarship funding in the spring.

The capstone work at OSH also ensures that students with disabilities (SWDs) can engage in this work by ensuring that accommodations and scaffolding is provided. The school also encourages students fulfill the capstone requirements through advanced Career and Technical Education (CTE) projects. According to the district's Superintendent, one of the most robust presentations he has seen in the past was completed by a student with a learning disability. Knowing that any student can access and excel in capstone projects, this has motivated the district and school to in build this capstone process as a promising pathway that allows every student to demonstrate their disciplinary knowledge and skills more fully, particularly when students can see the importance and relevance in projects pursued (Tzou et al., 2019; Penuel & Shepard, 2016).

A Capstone Process Aligned with an Instructional Model

As a project-based learning (PBL) school, the school adheres to a learning or instructional model that sets the critical foundation for students to participate in capstone projects. During multiple visits to OSH during the 2022-23 school year, a variety of CTE and core courses with a mix of veteran and novice teachers were observed. Across all courses, critical PBL features aligned with key principles highlighted by Baines et al. (2021) for this model surfaced such as 1) providing students with contextualized scenarios, phenomena or problems to address or solve through inquiry; 2) actively constructing disciplinary understandings and knowledge through the contextualized projects; and 3) engaging in collaborative work to build a community of learners in each classroom. Regarding the first feature, many of the projects pursued in regular classes including the capstone courses encourage students to focus on issues that have meaning and/or service to either the school or the surrounding community. This is intended to help students learn how they can use their agency to directly contribute to their communities and the larger society. For example, students in a chemistry class engaged in a water clean-up project focused on examining whether the community has access to clean drinking water.

Because the capstone projects follow the PBL-based instructional model at the school, this creates coherence between the regular curriculum and the capstone work. When teachers and students were interviewed, there was no ambiguity or question that the school pursues PBL as an anchor for all learning activities including capstone projects. This does not mean that all teachers have achieved fluency in enacting PBL, nor does this mean that the school's leadership believes that the school cannot continue to deepen their PBL work. As the OSH school leader noted, when the school embraced PBL over seven years ago, some veteran teachers departed when they realized that their teaching practices were inconsistent with this learning model. He also noted that some novice and veteran teachers struggle with attending to authenticity in the learning experiences designed. The leadership team views this struggle as a growth

opportunity for enhancing professional learning and practice at the school. This type of "horizontal coherence" (Shepard, et al., 2018) achieved at the school where all educators understand and believe in the established learning model for the school, ensures that students do not experience performance-based activities and assessments only through the capstone process, but are regularly immersed in these through this instructional model.

A Capstone and Instructional Model Supported by the District and Community

Building this capstone for all approach required an extensive network of support from the larger community and the school district. The Superintendent of OSD recalled being intimately involved with establishing a vision for the capstone work in close collaboration with OSH school leaders. According to the District Superintendent:

> I wanted the kids to be able to answer this question in the hallway, " what is citizen development about" because I've been telling people for a long time that I was curious about my students being a good neighbor or being able to pay taxes or working with others, and I would hope students could say, "hey, I think the school actually has an image, an idea, a concept in mind around citizenship beyond high school that isn't just around three math credits and four ELA credits." So that got into developing the portrait of a graduate...the second thing I really wanted to see in this school district is to be able to give every one of the employees a way to understand how they mattered.

The portrait of a graduate established by the district is connected to core beliefs focused on providing relevant learning experiences for students. These beliefs emphasize the importance of developing 21st century or "essential" skills such as collaboration and critical inquiry, with traits such as citizenry. Across disciplinary areas, teachers at OSH use the traits and skills embodied by the district's vision of a graduate in the design of their PBL curriculum and lessons. In every class we observed, students collaborated in pairs or on group projects to solve problems and develop solutions through valued traits such as contributing to teamwork.

The district's involvement with the capstone process also entailed providing the school with support and resources to connect with an external partner to build the capstone curriculum which would "align [a student's] chosen pathway with a culminating capstone project." According to the Superintendent, this required "getting teachers to actually build out the capstone process to determine…what the requirements are, what the supports are for students, what the engagement with the capstone advisor looks like, what the actual problems or projects could be, and how this is all vetted and approved." The school leader affirmed the key role that the superintendent played in spending "the entirety of the [capstone] planning process with us because it gave us direct access to the decision maker and the ability to come out of that policy with a policy already in hand and not something that had to be presented for approval…the district has done a really good job in leadership to make sure that the essential [or 21st century] skills are part of what we teach." From a systems standpoint, the close co-design work undertaken by the district and school together also contributes to vertical coherence (Shepard et al., 2018) where stakeholders situated across levels within the district system are committed to advancing the same vision for teaching and learning.

Another layer of coherence built in the system, is the connections that OHS builds with community members to support the capstone process. A key part of the capstone requirement is to work with a community mentor and this person typically also oversees a student's internship experience. Although students are not required to connect the capstone project with an internship, the principal notes that integrating these two areas generally makes for stronger community connections since the mentor is also directly involved in the capstone work. For example, two students had the opportunity to assist on a cancer research project as interns, and this experience and findings from this work became the focus of their group capstone project. Their mentor was an oncologist and participated in the review and the evaluation of their culminating group project. This example highlights how OSH leverages the capstone process to forge ties and connections with the larger community by involving members of the community in this process.

Learnings and Challenges

Based on discussions with the leadership team and other staff, the below areas reflect ongoing challenges that provide opportunities for continued growth:

- Establishing and investing in continuous support for educators to enact PBL and the capstone process.

Not unlike many schools nationwide, OSH experienced significant staff turnover during the height of the pandemic. Over the past three years, this has required continued training of new educators joining the school to ensure they can instruct using the PBL model and support students with the capstone process, as well as continued training of existing staff who may struggle with developing meaningful project-based lesson plans.

A solution implemented by the school in the 2021-22 school year to ensure that new and existing teachers

can receive continuous guidance on the capstone process was to establish a new cadre of capstone coaches comprised of strong teacher leaders. This group of capstone leaders are charged with providing professional development and mentoring to teachers seeking guidance on working with students on their capstone projects, strengthening the capstone curriculum including communicating expectations for educators and students each year, and ensuring that capstone project can be designed to meet key expectations outlined.

Regarding the PBL model, school leaders including teacher leaders across disciplinary areas acknowledge needing to bolster professional opportunities around PBL learning for teachers since well facilitated enactment of this instructional model requires significant and continued investment to help lessen the cognitive and instructional load of this work for both educators and students (Aldabbus, 2018; Kirschner et al., 2006). The school leadership team has plans to re-establish PBL-based training to ensure that their core instructional model continues to be supported and strengthened across all disciplinary areas.

- Finding ways to establish meaningful linkages with math.

The Capstone project requires student to demonstrate competency in reading, writing and communicating as well as math. In a school leadership retreat held in the spring of 2023, the cross-disciplinary group of teachers and capstone coaches acknowledged that most capstone projects do not involve the application of high-school level math. To clarify, students take the required coursework in math to graduate, but very few students find ways to make relevant and meaningful connections between the capstone projects they develop and math content and practices. We note here that although this and two other sites we visited in previous years have interpreted the capstone requirements in the state's graduation guidelines as needing to address both ELA and math standards, CDE staff have indicated that

flexibility can be taken where multiple options (e.g., using results from performance-based assessments and a capstone project) can be combined to fulfill the math and ELA requirement.

Demonstrating competency in math presents a challenge for the school leadership and staff to tackle, and potential solutions considered include encouraging interested students to engage more deeply with a math-based project encountered in a math class as a capstone project, or to put together a portfolio to accompany their capstone project that represents products of choice from high school math projects completed (including other subject areas). If using a portfolio with the capstone, students may also showcase artifacts of learning more broadly in math and in other content areas.

- Building a more comprehensive picture of learning through capstone projects.

If an external reviewer examined the capstone scores earned by seniors, the distribution of scores would reveal that there is little variability in the outcomes achieved by students on the capstone projects. That is, only a handful of students do not meet the pass threshold score on the capstone project and the vast majority score a passing grade of "2." This outcome may signal to some that the capstone projects are not rigorous enough since at the surface, the uniform performance reported on the capstone projects appear to contradict the variability of performance seen across other outcome measures such as grade point averages and SATs. A critical point to highlight is that these scores are not used to norm students, and that this lack of variability observed in capstone outcomes does not necessarily mean that the capstone learning experiences offered are not rigorous.

However, this points to the importance of better documenting the outcomes achieved by students as they build their work toward the culminating

performance assessment for the capstone project. That is, documentation of the work completed as freshman through the senior years including the iterative and any remediation work provided to complete the final performance assessment can provide a more accurate picture of the different trajectories that students take to reach the end point. As noted by one capstone coach, "many of our students are asked to revise their research work and papers…and re-do parts of their capstone project." Tracking what the learning journey looks like to reach the culminating assessment will provide a more accurate picture of the demands placed on students to achieve a passing score on the capstone projects. Beginning in the 2023-24 school year, OSH is investing in digital tools to better capture the progression of work completed by students over time to meet expectations on their capstone project. They have also recently partnered with an external organization that will build a platform to more accurately capture capstone outcomes achieved across time to better monitor performance trends.

Looking Ahead

Returning to the opening line of this brief regarding the continuous improvement process used by OSH to refine the capstone process each year, the school's leadership team will be testing out new processes aimed at strengthening students' uptake of PBL work in grade 9 and to participate in a mini-capstone project in grade 10. Grade 9 students will no longer be required to identify their capstone topic, since the school acknowledged that more time is needed to ensure that students build up more knowledge and skills in their pathways and disciplinary explorations during that year. By bolstering the confidence of grade 9 students to engage in PBL work, school staff believe that this can position them well for engaging in a smaller capstone grade 10 project that will allow

them to gain more applied research practice. This ramp up work in the first two years will then better prepare students to engage in a sustained investigation of their capstone project as juniors. The school leadership team believes that this new approach will likely make the looming capstone project feel less daunting for grades 9 and 10 students. Beginning in 2023-24, the school will track and evaluate adjustments made to the capstone process to ensure that these adjustments continue to improve upon the learning experiences offered through the capstone projects.

Acknowledgements

About CADRE

The Center for Assessment, Design, Research and Evaluation (CADRE) is housed in the School of Education at the University of Colorado Boulder. The mission of CADRE is to produce generalizable knowledge that improves the ability to assess student learning and to evaluate programs and methods that may have an effect on this learning. Projects undertaken by CADRE staff represent a collaboration with the ongoing activities in the School of Education, the University, and the broader national and international community of scholars and stakeholders involved in educational assessment and evaluation.

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