

# CULTIVATING CAPSTONES

*Designing High-Quality Culminating Experiences  
for Student Learning*

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*Series Foreword by Jessie L. Moore and Peter Felten*

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## FRAMES, DEFINITIONS, AND DRIVERS

### A Multinational Study of Institutionally Required Undergraduate Capstones

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More than 20 years ago, the Boyer Commission's *Reinventing Undergraduate Education: A Blueprint for America's Research Universities* (1998) recommended that all undergraduate programs include a capstone experience. Capstones enhance student learning by filling a gap in the undergraduate curriculum, which can seem fragmented without a culminating experience. They add value and, like all valuable things in a democratic society, should be subject to questions of equity and access. While almost all institutions of higher education offer capstone experiences in some form to some students, it is less clear how many meet the Boyer Commission's goal of capstones for *all* undergraduate students. Required baccalaureate capstones ensure equal access to a high-impact learning experience—but how widespread is this practice? How do institutions with required capstones define the culminating experience and its goals? What drives their commitment to this labor-intensive practice?

Our research team set out to determine the prevalence of required capstones in three countries: Australia, the United Kingdom, and the United States. By studying required capstones from a multinational perspective, we hoped to better understand the range of this high-impact practice in a variety of contexts. After identifying 55 institutions that require baccalaureate capstones, we analyzed the language in public-facing documents to better understand how institutions define and frame capstone work. The themes that emerged provide insight into what institutions value about

capstones and what drives their commitment. Our findings also suggest that there are many viable approaches to achieving universal access to capstones for undergraduates.

## How Many Institutions Require Capstones?

To determine the prevalence of required undergraduate capstones, we conducted a systematic review of higher education institutions in Australia, the United Kingdom, and the United States. Our data set included all 42 public and private baccalaureate-granting institutions in Australia and all 126 public, baccalaureate-granting institutions in the United Kingdom. Because the United States has more than 2,000 colleges and universities that grant 4-year degrees, we used a random stratified sampling procedure to select a subset of 319 institutions. For each institution in our sample, we systematically reviewed public-facing documents available online (academic catalogs, bulletins, and programs of study) to determine if the institution requires a capstone for all bachelor's degrees (see Table 1.1).

## How Do Institutions Define and Frame Their Required Capstones?

Clear definitions and effective framing can help institutions establish coherence for their culminating experiences. The language used to describe capstones can also impact buy-in from stakeholders, including students who must engage in capstone work, faculty who must design and teach the capstone, and administrators who must allocate resources (Budwig & Jessen-Marshall, 2018). From the 55 institutions with a required capstone, we collected all public-facing statements regarding this requirement. This included material written for a faculty audience as well as information geared to students. Using grounded theory, our research team identified

TABLE 1.1  
Percentage of Institutions in Sample With Required Capstone

Country	Institutions Reviewed	Institutions With Required Undergraduate Capstone	Percentage
Australia	42	2	5%
United Kingdom	126	5	4%
United States	319	48	15%

themes that emerged from the data and employed a consensus model for coding.

### *Defining the Capstone*

More than 90% of the institutionally required capstones in our data set are major capstones. A few U.S. institutions with project-based capstones allow or encourage interdisciplinary work. A minority of U.S. capstones—five of the 48 institutions—require a general education or core curriculum capstone that operates completely outside of the major. Most often, the general education capstone is a topic-based, multidisciplinary course. (For a different model of a general education capstone, see chapter 6.) One U.S. institution in our study requires students to complete both a general education capstone and a capstone in the major, which illustrates the distinct function of these two culminating experiences.

Most of the institutions in our study defined capstones as a wide range of experiences, which we have compiled and grouped here by similarity:

- senior seminar, capstone course, culminating course
- practicum, internship, co-op, clinical setting, student teaching, consultancy, applied activities
- research project, design project, scholarly inquiry, semester project, original project, independent study project, self-guided study, enquiry-based independent study, autonomous piece of research work, participation in a faculty-generated research project, construction project, engagement in an industry-driven project, investigations undertaken as part of preprofessional internship
- creative project, exhibition, performance, show, recital, artistic expression of some sort
- experiential learning, fieldwork, service-learning course/project, study abroad, immersion experience, intensive experience in the major or interdisciplinary field, integrative experience designed for the major
- signature work, signature project
- senior thesis, research paper, extended essay, dissertation, piece of academic writing, senior integration paper
- professional portfolio, reflection portfolio, portfolio of best work
- public presentation, participation in student symposium
- comprehensive exam, senior integration assessment

Several institutions maximize flexibility by adding terms like “any other appropriate mode,” “any other approved activity,” or “a similar product” to their list of acceptable capstone experiences.

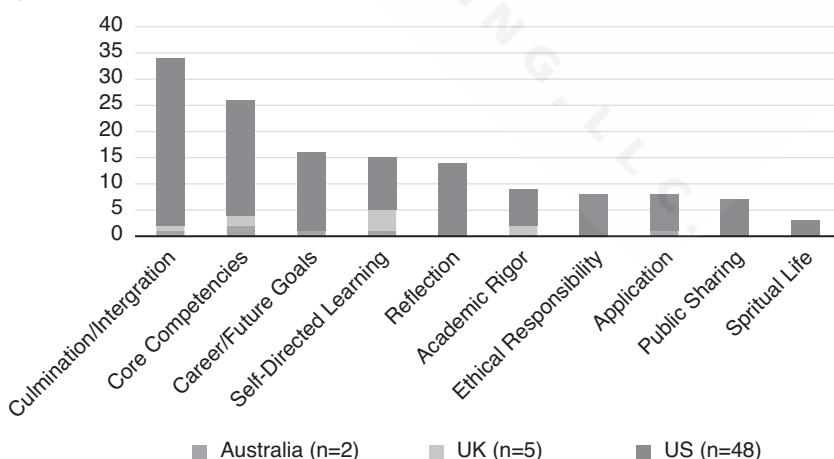
In contrast to institutions that emphasize multiple options for fulfilling the capstone requirement, a smaller number of colleges and universities promote the capstone as a shared experience for all students. These include institutions that require all students to complete an independent scholarly project as well as those that require a general education capstone in the form of a common, interdisciplinary course.

Some institutions appear to be balancing the need for flexible options with the need for consistency for all undergraduates. One institution stipulates that each capstone must include a writing and reflective component. Several institutions require applied experiences such as internships, co-ops, and other preprofessional experiences to include inquiry projects or written reports that require analysis, evaluation, or reflection. Because institutionally required capstones are often implemented in a variety of contexts, clear definitions are essential. Through brief statements or more expansive descriptions, all but three of the 55 institutions in our study set out the parameters of the capstone experience to establish a shared understanding of this requirement.

### *Framing the Capstone*

Ten themes emerged from the institutional statements, each providing a different way of framing the required capstone. These themes suggest capstone purposes and goals as well as institutional values (see Figure 1.1).

**Figure 1.1.** Frequency of capstone themes by country.



### *Integration and Culmination*

Almost two thirds of institutions with required capstones defined them as an integrative experience that requires students to draw together multiple aspects of their education, as is evident in statements such as these:

The senior year . . . represents the culmination of students' curricular experience. Seniors use this time to draw together and synthesize the various threads of study and experience through a variety of intellectual activities: senior seminars, comprehensive exams, theses, projects, performances and/or exhibitions.

A capstone experience is a high-impact educational practice in which students integrate and evaluate the knowledge and skills gained in both the General Education and major curricula.

Institutions with integrative capstones ask their students to "synthesize theory, knowledge, and experience" and to place disciplinary learning "in a larger social, intellectual, and professional context." Some institutions frame the capstone as the culmination of the major, while others ask students to draw together elements of the entire undergraduate experience in their capstone work.

### *Core Competencies*

About half of the institutions explicitly connect capstones to core competencies such as communication and critical thinking. Capstones can serve as a site of assessment, as is clear in these descriptions:

Each program of study will also use a capstone course or experience to provide both further application of higher order thinking and an assessable product to document achievement of the learning outcomes at the summation of the undergraduate experience.

These courses are designed to allow students to demonstrate their mastery of institution-wide learning outcomes as well as their achievement of competency in their chosen area of concentration.

By requiring the capstone to address broad undergraduate learning goals, these institutions have created a pathway for accountability. Academic programs must design their capstones to address core competencies, which ensures that all students demonstrate these skills before graduation.

### *Career and Future Goals*

Many universities and colleges see the capstone as a way to connect undergraduate learning with what comes next—whether that is a career or further

study. Career and future goals appear in almost a third of institutional descriptions of required capstones. Capstones are called “a bridge from college to career/postgraduate success” and an experience that will “prepare students for the intellectual, ethical, interpersonal, and professional challenges that lie ahead after graduation.”

Several universities promote capstones directly to students, emphasizing the role they can play in postgraduate aspirations. As one university puts it, the capstone is a way to “signal to professors, employers, and graduate programs that you are ready to make extraordinary contributions in your discipline, workplace, and community.” Another institution emphasizes that employers value the kinds of skills that capstones develop. Several emphasize the capstone as a customized experience, as this statement shows: “Each student’s unique capstone experience is completely tailored to their personal academic and career goals.” With increasing societal emphasis on career readiness and employability, many colleges and universities view capstones as a critical bridge between the undergraduate experience and postgraduate success.

### *Self-Directed Learning*

More than a quarter of institutions define capstones as an opportunity for students to take control of their own learning and see a project through to completion. Self-directed learning has long been a goal of higher education. The American Association of Colleges and Universities identifies agency and self-direction as one of the design principles for effective general education (AAC&U, 2015). In Australia and the United Kingdom, the emphasis on employability has shown the need for institutions to address skills like personal initiative, self-motivation, and the ability to work independently. It is not surprising, then, that institutions would see the required capstone as a means for promoting self-directed learning. Project-based or thesis capstones are more likely to emphasize student agency and self-direction, with the experience described in terms such as “an autonomous piece of research” or “a self-directed final production or product carried out under faculty direction.” One institution describes its capstone as a

complex individual or group project that is substantially defined and carried forward by the student under the guidance of a faculty mentor. It can take the form of a thesis or project; in consultation with a faculty adviser, you will define and carry forward the project on your own initiative.

Several institutions framed their capstone to emphasize the role of individual agency and personal interest:

Student inquiry and *personal interest* drive every original project.

All undergraduate students are required to plan, undertake and report on a scholarly project in *an area of their own choosing*. (emphasis added)

Our data show some national differences in this theme. While about a quarter of all the institutions in our data set emphasized self-directed learning, this theme was found in four of five UK institutions, a frequency that reflects the project-based nature of UK required capstones.

### *Reflection*

Reflection requires students to create connections among their learning experiences and to become aware of intellectual and personal growth. About a quarter of the institutions in our study defined the capstone in terms of reflection. Given that reflection is not a typical part of most disciplinary writing, the number of institutions in our study that include it confirms the importance of this activity to the unique goals of the capstone experience. There are national differences in this theme, as it is only found in U.S. institutions, perhaps a reflection of cultural norms that emphasize individualism and personal expression.

Fourteen institutions emphasize the reflective nature of their required capstone. One university designates reflection, along with application and synthesis, as core learning objectives. Another requires students to demonstrate writing competence and “reflect upon their intellectual development and the nature of knowledge in their domain of study.” Reflection supports program coherence, transition, and personal growth, as these statements illustrate:

The capstone experience invites students to reflect on the entire undergraduate experience with emphasis on the chosen major and future career.

By combining major capstone experiences with an opportunity to reflect on their educational experience and growth, the Core helps students identify and “own” portions of their educational experience that are particularly meaningful to them.

This writing intensive course invites students to reflect and analyze how their General Education Program has impacted their understanding of themselves in the world, as well as how their world view has developed.

Several institutions set up structures to support reflection in the capstone experience, including required components and the use of portfolios.

### *Academic Rigor*

As the culmination of the undergraduate experience, capstones afford students the opportunity to do their best academic work. This theme appeared in nine institutions' capstone descriptions. Some institutions promote capstones directly to students and encourage them to think big: "This endeavor will involve advanced work that addresses a significant issue, problem, or theme in your field—or in the world." Students are encouraged to see capstone work as meaningful:

[The capstone] is your chance to make change. Do the research no one's ever done, present it and publish your thesis. Launch a tech start-up, or a social entrepreneur venture. Build and program a robot. Write a textbook that revolutionizes how Modern Standard Arabic, or middle-school science, is taught. Write a novel. Develop original curriculum. Produce a feature documentary, or your own choreographed dance performance. Design and distribute new software or apps. Create and present a portfolio of original works. Design and curate an interactive art exhibit.

Institutions set a high bar for end products as well. One university asks students to view the final year project

as the pinnacle of their academic achievement, not only because of the academic rigor that is imposed on it by the University, but also because of the control they have to design, carry out and evaluate what they do. It is often seen to represent the point at which students become truly members of a disciplinary group.

Academic rigor was often described in terms of disciplinary contribution, as original scholarly or creative work that may be presented and published.

### *Ethical Responsibility*

Ethical responsibility appears in eight U.S. capstone descriptions. Some institutions define *ethical responsibility* in terms of academic inquiry, requiring students to "adhere to discipline-specific norms of academic integrity and ethical practices" and "reflect on the ethical issues that are implicit in their project." Another requires attention to consider "personal and professional values" as part of capstone work. Several institutions describe ethics in terms of civic responsibility, including several U.S. Roman Catholic institutions with general education capstones that emphasize social justice. One capstone

asks students to engage in “envisioning the future and humankind’s responsibility in helping to shape that future.”

### *Application*

Applied learning appears in eight institutional capstone descriptions. These institutions want students to “connect knowing with doing” through “experiential learning,” “hands on practice,” or “applied, real-world experiences.” Some institutions that emphasize applied learning include experiences that take students off campus as appropriate capstone work, including internships, clinicals, and fieldwork, while others emphasize applied learning within capstone courses and projects.

### *Public Sharing*

Seven institutions in the United States link the capstone experience to public sharing of academic work. Public dissemination of student work occurs through institutionally sponsored events such as poster presentations, performances, readings, and displays. Institutions host annual conferences, student symposiums, senior capstone celebrations, and award ceremonies. Institutions use public sharing of capstone experiences to promote the value of the undergraduate degree and to create a sense of institutional distinctiveness. The capstone is presented to students as an exciting milestone and a time for celebration:

In your final year . . . , it's time to show the world how far you've come. You'll complete your major with a capstone course or other advanced academic experience, then present your intellectual achievements through a thesis, recital, performance, or other public presentation.

Another university sets aside a day in spring for a campus-wide celebration of senior student capstone work. Many institutes publish samples or snapshots of student capstone projects on their websites, and several institutions publish all capstone work in digital repositories. One university's website includes a world map that tracks downloads of student work, with a message to students that “researchers and employers from across the globe can read, download, and share what you have accomplished.” One institution views public sharing of capstone work in a broader context:

Just as we expect scholars and artists to move beyond their fields of expertise and participate in collective activities that help to invigorate intellectual life, students are expected to engage in activities concurrent with [their capstone project] that broaden the scope of their intellectual endeavor and make their skills and viewpoints available to the College and the community at large.

Public sharing sends a message to students that the work they do in their capstone projects is not just a classroom assignment—it connects them with a broader community. Public demonstration and dissemination of student work has been designated a high-impact practice in the United States (Kuh, 2008) and one of the six principles of capstones in Australia (Lee & Loton, 2020).

### *Spiritual Life*

Three U.S. institutions describe their capstones in terms of students' faith journey and alignment with the affiliated church's values. One institution's capstone course engages an interdisciplinary approach to a local or global problem that "presents a test-case for this integrative experience and personal faith." Students at another institution must "demonstrate understanding of explicit and implicit connections between biblical perspectives and the discipline" as part of their capstone work.

## **What Drives "Capstones for All"?**

The institutional discourse surrounding capstones suggests a range of motivations: attention to student learning, assessment and accreditation, institutional mission, and enhancement of institutional distinctiveness. The pressure for accountability—whether this takes the form of academic program assessment or data on postgraduate employment—influences how institutions talk about their capstones and provides some insight into what motivates them to make the commitment to institution-wide requirements. For institutions in all three countries, capstones are a site for demonstration of the institution's undergraduate core competencies or learning goals. Institutions of higher education in Australia, the United Kingdom, and the United States also face the pressure to attract and retain students. Capstone experiences can enhance institutional distinctiveness, whether the goal is to market a university's research prestige, a college's attention to career preparation, or the customized experience a student will get.

In U.S. institutions, general education has had a large impact on institutionally required capstones. Many institutions have revised their general education or core curriculum in terms of key undergraduate learning outcomes, aligning general education and baccalaureate learning outcomes. The Association of American College and Universities LEAP initiative (Liberal Education & America's Promise) established an influential

set of essential learning outcomes, including one that aligns with the goals of capstones:

Integrative and applied learning, including synthesis and advanced accomplishment across general and specialized studies, demonstrated through the application of knowledge, skills, and responsibilities to new settings and complex problems. (National Leadership Council, 2007, p. 3)

Fourteen states in the United States have joined the LEAP States Initiative, a set of formal collaboratives that promote large-scale implementation of high-impact practices like capstones. Similarly, the Lumina Foundation's Degree Qualifications Profile (Adelman et al., 2014) emphasizes applied and collaborative learning through activities that require students to address unstructured problems, conduct scholarly inquiry, and apply knowledge and skills in and outside the classroom—the kinds of learning that often happen in capstones. Our data shows many institutional statements on capstones include language that echoes either the AAC&U's essential learning outcomes or the Lumina Foundation's Degree Qualifications Profile. As institutions revise their general education and core curriculum programs to focus on core learning outcomes, many see senior-level capstones as an effective way to include integrative learning in the undergraduate curriculum.

General education plays a large role in how U.S. institutions in our study implement their required capstone: 43% require the capstone through their baccalaureate requirements, while 57% house this requirement in the general education or core curriculum program. (Higher education in Australia and the United Kingdom does not have a general education component, so all capstones are a component of the major.) Even when an institution houses the capstone within disciplinary majors, it fulfills a general education or core curriculum requirement. In terms of implementing change, it can be easier to revise the general education program rather than to implement a new baccalaureate requirement. Locating the institutional requirement within a general education program also provides a structure for accountability and a site for assessment.

There is alignment between the institutional statements we studied and scholarly literature about capstones. Institutions have clearly drawn on higher education literature as they have developed required capstones, just as scholarship often describes best practices at institutions like those in our study. Whatever the synergy between theory and practice, the result is alignment in the language used to describe capstones.

### *Implications for Faculty Who Teach or Direct Capstones*

This study provides insights into the landscape of required capstones, including institutional strategies for defining and implementing this requirement, common themes used to frame goals and purposes, and possible drivers that motivate institutions to provide “capstones for all.” Our findings can benefit faculty who teach or direct capstones by providing a broader context for reflection:

- *Drivers.* How does your capstone support your institution’s mission? Do your capstone learning goals align with your institution’s undergraduate student learning goals? How might your capstone contribute to the creation of a distinctive learning experience that will attract new students? How does your capstone prepare students for career or further study?
- *Frames.* How do you frame the capstone in your syllabus, assignments, and discussion with students? Have you explicitly stated the purpose and value of the capstone? Do your learning outcomes align with any of the themes in this study? Which additional themes might enhance the capstone experience for your students?
- *Definitions.* What are the parameters of the capstone that you teach or direct? Would students benefit from having more options for types, formats, and products? Would students benefit from more clearly communicated expectations about process and product?

### *Implications for Administrators and Institutions*

Institutions planning to implement a required capstone or expand their capstone offerings can benefit from considering these questions:

- *Drivers.* What factors are driving our institution’s interest in capstones? How will the capstone fit into the institutional structure? Will the capstone address broad undergraduate learning goals as well as disciplinary learning goals? For U.S. institutions, will the capstone be a baccalaureate requirement or a general education/core curriculum requirement?
- *Frames.* What is the purpose of capstones at our institution? Broadly speaking, what do you want students to do and demonstrate in the capstone? Which frames from this study might best serve our institution? Which frames will be most persuasive to stakeholders, particularly faculty and students?
- *Definitions.* What kinds of learning experiences will qualify as a capstone at your institution? What essential elements must each capstone include? How can you build on the existing capstones in our programs?

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