Development of a Graduate Technology Project to Teach Advanced Skills Through the Design of a Regional Vaccination Hub

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Abstract

In response to evolving knowledge and skills utilized in the field of Technology Management, a graduate Technology Management program at a US regional university recently updated their program's core curriculum resulting in the addition of a new course in Project Management Tools and Techniques. The purpose of this course, introduced in the Spring 2021 semester, is to provide greater emphasis on the concepts of pricing, estimating, cost control, risk management, and quality management. The instructor sought to create course activities that would facilitate student engagement and learning in these areas and relate the course activities to real-world situations. To achieve this, a novel case scenario was created to serve as a framework for students to assume the role of project manager and develop realistic plans for the implementation of a regional-scale, mass vaccination hub facility that could be rapidly brought on-line for utilization by official emergency management organizations in the event of another health crisis of a nature comparable to the recent Coronavirus pandemic. Students were presented a real-world, practical challenge requiring them to conduct relevant research and apply advanced skills aligning with course and selected program student learning outcomes. Project deliverables included mile-stone reports for key stages in the planning of the facility including identifying site design specifications, site selection, and facility structures and a final project video presentation directed to the sponsors identified in the project scenario. Students viewed and provided evaluations for project video presentations created by their peers. The project was based on a theoretical concept conceived by the instructor as one with the potential to serve as a baseline model that could be replicated for expedient implementation in any region. Student solutions to the challenges posed in the project would serve as a general proof of concept for the model of this theoretical facility.

Keywords: graduate simulation project, project management, emergency response, vaccination hub model

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Evolving knowledge and skills necessary in the field of Technology Management forces instructional programs to regularly assess and adjust their curriculum to ensure continued relevancy. In response to this, the Technology Management Graduate Program Committee at an on-line, graduate Technology Management program at a US regional university recently updated their program's core curriculum and added a new course to provide greater emphasis on specific concepts associated with project management. The course was built around the central concepts of pricing and estimating, cost control, risk management, and quality management. To facilitate student engagement and learning in these areas and relate the course activities to real-world situations, I devised a novel case scenario to serve as the framework for students to develop plans for a regional-scale, mass vaccination hub facility based on a theoretical concept that could potentially serve as a standardized model for expedient duplication and implementation in any region.

Student Learning Outcomes Alignment

To strengthen the Project Management segment of the Master's Program in Technology Management at the university, general concepts of project management that had been incorporated into a single course were divided into two sets and the concepts of pricing and estimating, cost control, risk management, and quality management removed to form the basis of a new course, Project Management Tools and Techniques. The implementation of the new course required that curricular components be created, revised, or adapted, and new, relevant activities be developed to align with the desired course and applicable program outcomes. Course-specific student learning outcomes defined for this course are stated,

Upon satisfactory completion of the course, the learner should be able to:

1. Develop pricing, estimating, and cost control strategies, including life-cycle costing and other quantitative tools.
2. Demonstrate techniques for identifying, mitigating, and managing risk in projects.
3. Demonstrate the implementation of tools and techniques for managing quality in projects. (Davis, 2021a, p. 2)

Program student learning outcomes state that graduates will,

1. evaluate and defend leadership and organizational strategies associated with technology-intensive enterprises,
2. summarize and explain organizational development and strategies common to technology-intensive enterprises,
3. formulate and assemble component ideas in order to successfully execute a project plan, and
4. analyze information in order to formulate effective solutions. (Davis, 2021a, p. 2)

Project Scenario Development

My primary goal in devising this project was to present students with a real-world, practical challenge requiring them to conduct relevant research and utilize advanced skills aligning with the student learning outcomes designated for the course. To guide the development of the project, I took cues from the evolving COVID-19 response activities intended to provide a means of quickly and efficiently vaccinating large populations of people. To ensure maximum diversity and portability of the model, I selected a strategic portion of a defined geographic region designated as a Disaster District within one of six regions

established by the Texas Division of Emergency Management (n.d.,"Regions") that contained urban, sub-urban, and rural areas to serve as the assigned region in the project.

The multiple approaches and variable functionality and effectiveness of mass vaccination hubs being employed across the country as vaccines were made became available made it apparent to me that a vaccination hub model that could be implemented quickly, economically, across a variety of regions, and with minimal impact on existing infrastructure would be highly beneficial for emergency response agencies and organizations charged with such a task. The Federal Emergency Management Agency (2021) provides a comprehensive guide, the *Community Vaccination Centers Playbook*, on which vaccination center operations of multiple types are to be based. The scenario I envisioned aligns with FEMA parameters and utilizes a Public Private Partnership (PPP) to facilitate the creation of a versatile drive-through hub facility. A local, full-service contractor would be utilized to identify an appropriate location and prepare the site, within a pre-defined scope of work, for utilization by the lead agency. Upon completion of the facility, the private entity's responsibilities would be complete and the hub site would be turned over to the public entity for staffing and operation.

Concept Vision and Premise

The notion driving the creation of this model is summarized in the project's vision statement, provided in the project assignment. The concept vision is to quickly mobilize to provide a functional hub facility to enable high volume vaccination services to be provided over a finite period without occupying existing venues and preempting normal activities while also creating minimal disruption to the neighboring communities. Upon fulfillment of the facility's purpose, it can be quickly cleared from the premises and the property returned to its previous, or better, condition. The ideal outcome is for this and similar facilities to be successful to the extent that they render themselves unnecessary by the end of their two-year operational design and can be decommissioned. (Davis, 2021b, pp. 2-3)

In the rush to quickly implement vaccination hubs in response to the COVID-19 Pandemic, temporary hubs were improvised at facilities designed for a myriad of other purposes such as sporting stadiums, fairgrounds, schools, churches, and similar venues. One would presume that the time would come when these facilities would be needed for their intended purposes and the dual utilization of the facilities could result in interference between the two activities. To help avoid future disruptions of service at vaccination hubs and preemption of primary functions at active, existing facilities, I developed this alternative hub model concept to use an available, but otherwise unoccupied, property for the temporary erection of an expedient, flexible, fiscally responsible, extended-term, non-permanent, drive-through vaccination hub facility. Key criteria of this facility concept include:

- Located appropriately to maximize convenience in access by residents of geographical region (counties) served.
- Utilize real estate that is presently available and of adequate size and configuration for vehicle staging and drive-through service.
- Utilize semi-permanent or temporary structures to shelter vaccination and support workers from sun and inclement weather while allowing for social distancing and the administration of vaccinations while permitting patients to remain in their vehicles.
- All structures can be quickly installed for initial start-up and removed at the time of hub decommissioning such that the property is returned to original condition.
- Ability to replicate facility model across many regions.
- Expectation of two years of operation as a baseline, with possibility of incremental extensions if warranted. (Davis, 2021b, p. 2)

Project Phases

The students' assigned role in this simulation project is that of Project Manager and primary contact for the selected private contractor with the responsibility of conducting necessary research, developing the specific plan for implementation, and reporting their justifications and progress to the appropriate public entities at key stages. For the purposes of establishing a practical and realistic framework for the project, the Federal Emergency Management Agency (FEMA) and the Texas Division of Emergency Management (TDEM) are designated as the sponsoring public entities. The project phases for which status reports are required, in the order due, are designated as Site Design Specifications, Site Selection, and Facility Structures. The project culminates with the fourth deliverable, a final video presentation, prepared by the student, with representatives of the receiving entity as the intended audience, which provides an overview of the work performed from the initial proof of concept activities to the final "shovel-ready" plan for implementation.

Site Design Specifications

The student is responsible for conducting due diligence through examining regional data and best practices and lessons learned by existing regional hubs to establish further criteria for specifications, functional characteristics, and design elements for the facility. To guide the activity, students were instructed to address the following considerations: volume capacity requirement, number of workers on-site during peak operation, size of tract necessary, traffic management, and utility needs. The deliverable required for this phase is a concise, narrative report of the site specifications determined to be appropriate and the process and rationale for their selection during the design phase of the project.

Site Selection

In the second phase of the project, the student is tasked with identifying a suitable parcel of property at an appropriate location. Considerations identified for purposes of site selection included: accessibility, availability of utilities and related infrastructure, topography, all-weather/all-condition surface requirements, presence of existing facilities/structures, possible impact on adjacent communities, and potential zoning conflicts. Students were also asked to consider advantages of various terms of occupancy/utilization (land purchase vs. lease vs. other option.) The deliverable for this phase is a narrative report identifying and describing the parcel of property selected for the facility and explaining the process and rationale the student used in making this selection.

Facility Structures

Following the identification of an appropriate site, the student's third task is to research and compare practical options for physical structures that could be utilized on the site and identify their recommended option. Students were directed to address the following considerations for this phase: purpose and appropriate size of needed structures, compliance with capacity and social-distancing requirements, temporary vs. semi-permanent vs. permanent structures with an expected lifespan exceeding the facility's projected two-year life-cycle, purchase vs. lease options, structural integrity/quality/durability and safety features, lead/prep time and erection time and expense, recurring expenses, and removal expense and/or residual value. The deliverable required for this phase is a narrative report identifying and describing the necessary structures selected for use at the facility and explaining the rationale for making these selections.

Project Presentation Video

The student's final activity and deliverable is an intuitively organized video presentation that provides an overview of the work completed at all project phases. The presentation must address how the

plan aligns with and accomplishes the goals of the new hub facility concept. To address the fiduciary accountability expected of public projects, the goals of minimizing Life Cycle Cost (LCC) for tangible assets and investments and maximizing Residual Value (PV Residual) at the conclusion of facility operation were identified as project priorities. The student must also include in the presentation their analysis of Life Cycle Costing for their selected facility options in comparison to options considered but not selected and a description of the strategy they used to plan for a minimal Life Cycle Cost for the overall project. A discussion of the tools or techniques the student used to identify and mitigate any risk factors that could potentially affect the project or facility during the term of its operation is also to be included. The project assignment is completed with a peer-review exercise in which students complete an assessment form to evaluate their own presentation and those of an assigned group of peers.

Summary

The project guides students through a structured set of staged activities that challenges them to employ advanced skills to design a regional vaccination hub plan aligning with the parameters I established in the conceptual model. Students are required to create and submit progress reports for project phases at three specified intervals during the project. These documents are required to be appropriate for presentation to specified federal and state emergency response organization partners identified as sponsors for this simulated project. The project phases align with the primary concepts of project management forming the foundation of the course. The projects culminated with students preparing and sharing a final video presentation of their proposed hub facility. Students are given an opportunity to view and evaluate their peer's presentations. This activity component served as an opportunity for students to improve proficiency using advanced modes of electronic communication.

Based on the content of assignment submissions, I have identified the need for greater clarity in the project assignment regarding the required parameters for the facility. The project activity further

provides a general proof of concept for the theoretical facility model. A survey of facility plans created through this course project provides an indication that the possibility of implementation of regional vaccination hubs based on this conceptual model warrants further investigation.

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