A Story of Online Construction Masters' Project: Is an Active Online Independent Study Course Possible?

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Abstract

With the availability of online teaching tools, educators got the opportunity to create learning environments for students that are flexible and user-friendly. Though being exciting and intuitive, this opportunity comes with great responsibility, as students may be lost in online education without any face-to-face (FTF) contact. Engaging online students becomes even harder in an independent research study course, where students are expected to perform a high level of self-directed work. It is a challenge to promote an online independent study, as students need to be active, engaged, motivated, and prepared in the virtual environment. Additionally, the non-traditional nature of online students requires flexibility and interactive teaching methods to sustain collaborative and connected learning. The Construction Management (CM) Masters' Project at Jefferson is an independent research study that serves as the culminating experience in the program, where students choose their own project to produce a comprehensive Project Manual with an oral defense presented at the end of the semester. This paper identifies best practices for delivering an online Masters' Project course, which is engaged, collaborative, real world-based, and grounded in the liberal arts and sciences. The methodology will include creation of online learning models, assessing principles of online independent study development, and evaluating the new online Masters' Project delivery model with a pilot group of students. Results will be used to create guidelines and assessment methods for faculty, who teach online independent study courses and who are willing to embrace the emerging online education phenomenon in construction.

Keywords

Construction management • Online independent study • Best practices for online teaching

102.1 Introduction

With the growth of internet, web-supported education has taken its place in today's higher education institutions [1]. Many researchers have been in favor of implementing technology-based services in higher education and believe that technology has the capability of increasing student participation and comprehension [2]. Online education has been an opportunity for educators to utilize technology in offering flexibility to students in terms of location and time. This has been particularly appealing to adult learners and students with non-traditional life styles (i.e. who are working part-time or full time) [3].

While opponents of online education emphasize the lack of face-to-face (FTF) contact, proponents argue that FTF interaction can be substituted by online discussions in bulletin board systems or online video conferences [4]. Being very different from FTF instruction, online courses need a unique delivery method to make sure the connected learning is achieved between the instructor and students [5]. Engaging online students becomes even harder in an independent research study course, where students are expected to perform a high level of self-directed work. Therefore, it is very important to set guidelines to design and assess the online environment [6]. This paper identifies best practices for delivering an online

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independent study course through evaluating the new online Masters' Project delivery model with a pilot group of students. Best practices presented in this study are created around VOCAL [7] and Jefferson' Nexus Learning Principles [8], i.e. engaged, collaborative, real world-based, and grounded in the liberal arts and sciences.

102.2 Background

Despite the opponents, online education was found to improve students' critical thinking, problem-solving and collaborative learning skills [9]. Some of the innovative online teaching techniques were mentioned as emails, video conferencing, static and dynamic Web pages, case studies, audiovisual presentation, assignments/quizzes, and project works [3, 10]. Two common ways of online teaching are defined as asynchronous and synchronous. Asynchronous teaching is achieved through recorded video lectures and assignments that can be viewed anytime/anywhere, whereas synchronous teaching involved in live/real-time video lectures, where students should log into an online portal on a pre-set date and time.

Different guidelines have been proposed for online education. Penn State University in association with other two universities developed a set of guidelines and benchmarks for distance education [11]. Recommendations include:

- Create and prepare instructional materials for delivery via distance education
- Use specific instructional activities that are beyond direct instruction to meet the goals and objectives of the course
- Ask learners to design an "Action Plan" to demonstrate they understand and accept responsibility for achieving the learning goals
- Provide effective learning environments to enhance interactions among students and the instructor
- Allow students to self-monitor progress by providing feedback.

Ten (10) principles of effective online teaching was set in a Magna Distance Education Report as [12]: show up and teach, practice proactive course management strategies, establish patterns of course activities, plan for the unplanned, response requested and expected, think before you write, help maintain forward progress, safe and secure, quality counts, and (double) click a mile on my connection.

Another approach to online education is set as VOCAL principles [7]. Online educators are called to be VOCAL, where the acronym identifies the characteristics of an effective online instructor as one who is: **V**isible, **O**rganized, **C**ompassionate, **A**nalytical, and a **L**eader-by-example. The study claims that each component of VOCAL contributes to a positive teaching experience for both educators and students.

With this abundance of online education research and strategies to make online education effective, still there are no guidelines set for online independent study courses. As mentioned before, online independent study courses include self-direction and a higher level of autonomy than lecture courses. This unique situation causes not only the students to get confused, but also the educators to need extra help and clear directions on the course design, organization, and assessment. The framework of this study employs the practices of VOCAL in exploring the best practices of online Masters' Project delivery. While VOCAL principles support a positive learning environment, Nexus Learning Principles will be used to obtain effective and engaged online teaching in independent study courses.

102.3 Methodology

The motivation of this study is to answer the question: *How to deliver online independent study courses effectively?* Primary goals include creating effective online teaching modules and best practices for faculty who teach online independent study courses using VOCAL and Nexus Learning principles. In order to fulfill these goals, the flowchart in Fig. 102.1 is created. The details of each step will be covered in the following sections.

102.3.1 Principles of Online Independent Study Development

VOCAL guidelines were re-interpreted to fit into the asynchronous online independent studies and the principles below were created to be tested in the new online Masters' Project delivery model.

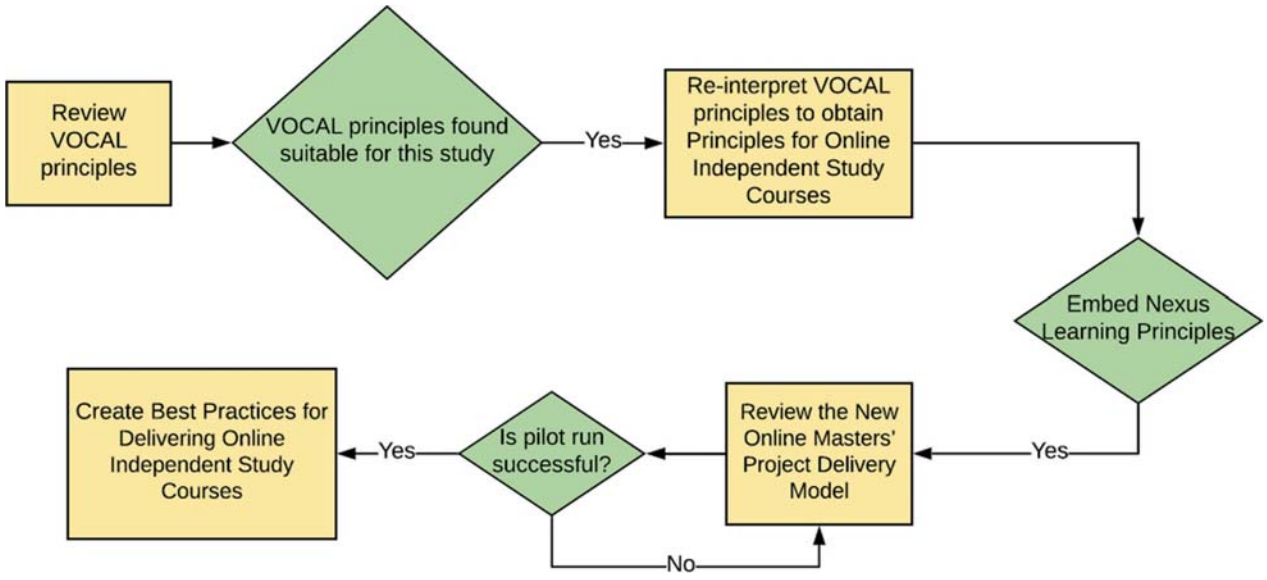

Fig. 102.1 Effective online independent study flowchart

Visible means being virtually available to students. Online learners, especially new students, may not know the extent of the Learning Management System (LMS) used. Therefore, it is very important to encourage students to check their university emails and LMS frequently for 'visible' to work successfully. Students should be clearly informed about the virtual attendance policy and on how to connect to the instructor.

Organized includes providing a structured learning environment. This is a must for all online courses, however the addition of the last bullet point above is unique to independent study courses. Independent study courses give students' autonomy to control their own organization and schedule. Therefore, they will be asked to create a dynamic timeline for their preliminary deliverables and final project binder in the Masters' Project course.

Compassionate is about providing a welcoming learning environment. There are set basics to warm online students up to the learning environment and their peers, such as encouraging students to communicate with the professor and with one another. In the online version, being compassionate has to be performed all virtually, which requires the educator to be active in LMS as well as in any other online systems used.

Analytical is usually achieved by using low-stakes assessment activities. Although independent study assignments do not require fixed answers, students are very much in need of feedback and checkpoints throughout the process. Low-stakes assignments allow both parties to track student's progress over time. Meanwhile students learn the 'acceptable' content and format of submissions.

The main point in being **L**eader-by-example is to set an example online persona in the virtual class and keeping your word related to course activities. All educators on campus or online set the example for their students. In an online setting, leadership has to be set by written approaches and following due dates and meeting times as promised. As students are expected to follow due dates and have an organized calendar, it is very important that the educator to show strong skills in this area.

102.3.2 The New Online Masters' Project Delivery Model

This section includes how Nexus Learning Principles have been embedded into the Masters' Project Course. As the background information, Masters' Project is the last course Masters of CM (MCM) students are taking at Jefferson. This course is equivalent of a Masters' Thesis, where students choose an actual construction project and prepare an extensive bid package with the following sections: Executive Summary, Company Information, Project Information, Revit Model, WBS, Estimates, Schedules, Cash Flow, Site Logistics Plans, Means and Methods, Risk Management, Safety Plan, Environmental Plan, QC/QA Plan, and LEED.

Fig. 102.2 Masters' project activities around nexus learning principles

As each project is unique, students go through a unique critical thinking process to solve specific issues related to the actual construction process. They frequently meet with the professor and an advisor, who is a professor or a construction expert from outside. The end-product, as the comprehensive bid package, is submitted as a written report and is presented to CM faculty and outside evaluators from the construction industry. Due to its setup, this course is a best fit for applying all four Nexus Learning Principles of Jefferson as:

- Engaged/Active Learning
- Collaborative and Connected Learning
- Understanding the Real World
- Grounded in the Liberal Arts (Fig. 102.2).

In an online independent study, engaged/active learning can be achieved by creating online learning modules that gives room for interactivity. Using interactive course material with video lectures and various sources such as Open Electronic Resources (OERs) will help in this case. There are software applications that can be used with MS PowerPoint presentations [13] or other applications that can convert any video into interactive lessons by adding video and questions to the content [14]. In the new Masters' Project, online students are asked to set comprehensive objectives and create a dynamic timeline. This timeline was created with the scheduling software MS Project and has to include milestones and preliminary and final submission dates, as well as the duration of each section mentioned above. As an example, students are asked to mark dates of when to start the estimating process, when to meet with the professor and advisor, and when to finalize their detailed estimate. They listen to video lectures related to the topics in the bid package and submit weekly progress updates to Blackboard. The updates include written submissions as well as presentations to increase student engagement.

The collaborative learning portion is achieved by setting up online meetings with the professor and advisor. Blackboard has room for collaboration through the setup of online discussion boards. In the pilot setup of the Masters' Project, OneNote Class Notebook [15] was used to improve connectivity among the professor and students. Class Notebook has a course setup that allows a collaborative area and one-to-one shared pages with each student. Feedback to students' preliminary submissions and notes about their progress were shared through this platform in addition to Blackboard.

Understanding the real world is achieved though working in actual construction projects with selective standards based on the project location and requirements of the specifications. A high level of proficiency in research and professional presentations in terms of oral and written submissions were used to support grounded in liberal arts principle.

102.3.3 The Pilot Run of the Online Masters' Project

The new model with VOCAL and Nexus Learning principles were practiced within a hybrid setting. Students were informed about the definition and requirements of the Masters' Project before the semester starts, so that they can find a suitable project and create the dynamic timeline on time. Students were welcomed on the first week of the semester, where the digital tools to be used were explained. All students were familiar with Blackboard, but only one student was familiar with OneNote. OneNote signup process was explained to students by using the institution's Office 365 license. There were some technical issues, where students could not log into their accounts. This problem was resolved by the IT Department. However, outside advisor could not get access to the OneNote Class Notebook due to not having institution's email accounts.

Students were provided video lectures to review course topics including course overview, project information, Revit, estimate, schedule, cash flow, risk, quality, safety, and environmental management plans, site logistics plan, means and methods, and Leadership in Energy and Design (LEED) sections. Each week, students were required to review the lecture

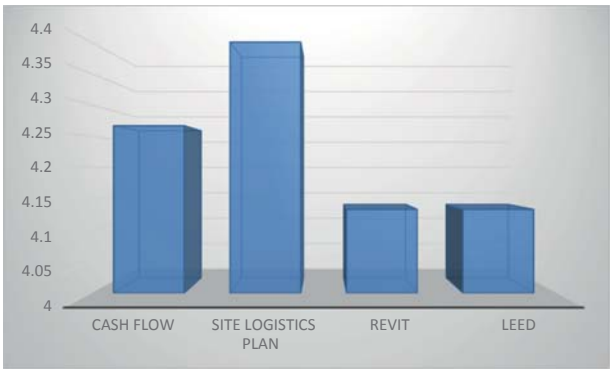

Fig. 102.3 Masters' project low-stakes assignment survey results on a 1–5 scale

notes with supplementary reading and fill in the provided templates to have draft versions of these sections. Students submitted twelve (12) progress presentations within fifteen (15) weeks of the semester durations to prove their progress and earn partial grades. This process is not very common for an independent study, however the low-stakes assignments were used to help students to be more engaged and organized. Students were surveyed to collect data about the effectiveness of low-stakes assignments on a 1–5 scale. In total, 165 data points were collected. Four topics of the average results are presented in Fig. 102.3. The preliminary evaluation of the results showed that students were satisfied to highly satisfied (4–5 scale) with the video lectures and their related assignments. Among the categories evaluated, only means and methods and safety templates were found on a 3–4 scale corresponding to neutral to satisfied ranges. These two topics were re-evaluated for improvement and it was found that students needed clearer direction on how to use the provided MS Excel templates. The improvement was decided to record video lectures specifically on filling out templates for the next offering of the class.

Students were also asked about their meetings with the professor and their specific advisors. While the meetings with the professor were rated as satisfied or highly satisfied, the scores of advisors meeting had a range of 2–5, meaning dissatisfied to highly satisfied. This range of results were due to having different advisors. In this pilot offering, there were 2 full time CM professors and 5 outside CM professionals as advisors.

Another aspect of the survey was to evaluate OneNote as a tool to improve connection between students, professor and advisors (Fig. 102.4). Around 50% of the class found OneNote very or extremely helpful, while a small portion found it not helpful at all. Written feedback was collected from students related to their use of OneNote. One of the cons was the login issues students' experiences. Although this was solved by IT, it created a barrier between students and educators. Another issue was the inability to have outside advisors on this platform. On the next offering of the class, outside advisors would be added to the institutions system to be able to give them access to OneNote. A repeated comment from students included having too many online systems running at the same time. Students were looking to a single platform to include all information, assignment submissions, and feedback. Unfortunately, Blackboard was not flexible for this purpose. Although OneNote was found user-friendly, students had a hard time tracking information on various platforms.

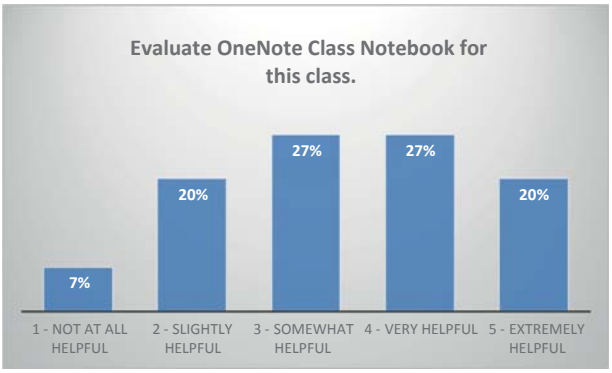

Fig. 102.4 Evaluation of onenote class notebook

102.4 Best Practices for Delivering Online Independent Study Courses

The results of this study were used to set the following best practices as a combination of the re-interpreted VOCAL and Nexus Learning:

- **V**isible
  - Sent Welcome to the Week Emails every week on the first day of the week to show that the professor is virtually there reminding them the agenda of the week.
  - Reply to emails within 24 h.
  - Show students that you can track their virtual attendance through the LMS or other platform as used (e.g. Blackboard has a retention center to track students' activities).
  - Hold live meetings via Adobe Connect, Zoom, etc. to improve connection among students and the professor. This will improve collaborative and connected learning.
  - Use live meetings as opportunities to collect formative feedback (i.e. this was used to collect feedback on OneNote and to solve IT related issues on the pilot run).

As it can be observed from above, 'visible' requirements are not very different from any online courses for online independent studies. The key part is to set the visibility platform and the frequency of activities. When an additional software like OneNote is used, students should be told on the log in credential and the specific use of the software. OneNote was found effective on giving one-to-one feedback to student files in various formats such as PDF, word, or excel.

- **O**rganized
  - Tell them what is expected of them clearly (e.g. when to report, which templates to use and how to use them).
  - Give them a Weekly Schedule with assignments and due dates, including required meeting times and frequency. As online independent study will have online meetings, student should know how to attend virtual meetings and how to use the virtual platform. Technical issues are inevitable in this case, so it is suggested to have IT support ready.
  - Allow self-organization (e.g. dynamic timeline). Independent study students need autonomy to achieve the overall goal of the study. It is required to give online independent study students a controlled autonomy through tracking their dynamic timeline. This will help students to be active learners.
- **C**ompassionate
  - Use an online ice-breaker to know your students and to motivate students to know one another.
  - Encourage students to communicate with you via email or other preferred method. In the online setting, you will not hear issues as they happen, so it is required to have a virtual open-door policy to invite students to connect. This will also increase students' professional communication skills and support infusion of liberal arts.
  - Use personalized reminders (e.g. course progress concern alerts). These alerts can be created on Blackboard for each student while tracking their virtual attendance and can be emailed them separately.
  - Allow time for students to process. Students need time to understand the online independent study setting and online platforms used for engagement. Demo submissions and discussion boards will help to ease this process.
  - Make sure they understand what an online independent study means (i.e. *set expectations*). It should be clarified that this is not a lecture setup and there are no fixed correct answers. The uniqueness of this situation should be emphasized in written feedback provided to low-stakes assignments to remind this to students over time.
- **A**nalytical
  - Use smaller and more frequent assessments. Students can be asked to upload their draft submissions as low-stakes assignments. As mentioned before, in the pilot run, students uploaded 12 sections over 15 weeks to receive feedback and show their progress over time.
  - Allow room for feedback. Students need detailed feedback on their independent study. A flexible and user-friendly environment like OneNote is helpful for this purpose. OneNote allows figures and different file formats to be included in each student's page/journal. Emails can be sent from Outlook to OneNote to keep track of all communications with each student and make sure they receive feedback virtually. As an additional advantage, having OneNote app on their phones will allow students to access data frequently and easily.
  - *Determine 'acceptable'* (i.e. a threshold for research and other activities). Although it is very hard to set a threshold in an independent study, students frequently ask what is accepted as 'enough.' It is good to show previous examples and highlight their ups and downs to help students decide on the 'acceptable.'
  - Provide mid-semester and end-of-semester surveys for students to evaluate the online course.

- **L**eader-by-example
  - Follow through with promises.
  - Give timely feedback.
  - Model the way to behave in an online environment. When the professor follows the rules and pre-set due dates, students will tend to mimic this behavior.
  - *Remind learning outcomes* and connection to other courses in the curriculum. Students are motivated to learn when they know why they are learning a certain topic and how they will benefit from that in real-world. Therefore, it is needed to help them connect the dots in-between different courses they have taken and to remind them what they will gain at the end of the class through learning outcomes.

102.5 Conclusions

This study focused on identifying best practices on online independent study delivery through combining VOCAL and Nexus Learning principles. Jefferson's Masters' Project course was used to assess the preliminary principles and obtain the finalized best practices presented. The assessment was performed by using a pilot run of this class with MCM students. Students were asked to evaluate all low-stakes assignments, their meeting with the professor and advisors, as well as the OneNote software setup. The results showed a need in best practices to involve student autonomy and better technical guidance on OneNote. Based on student feedback, OneNote Class Notebook has great potential to improve collaboration and connection among parties, if the technical and advising issues are fixed.

Faculty, who teach online independent study courses and who are willing to embrace the emerging online education phenomenon in construction, can use the best practices and the new online Masters' Project delivery model presented to develop and improve online independent study courses like Jefferson's Masters' Project course. Future studies will include expanding the use of OneNote for fully online settings and testing its effectiveness.

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