Adapting Online Learning for the United States Military Academy

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Abstract:
This research explores how online learning is conducted for higher education. This is a rapidly growing field that allows student-teacher interaction to occur beyond the traditional classroom environment. This work specifically considers the various modes that online learning can use to disseminate information. It reviews the current and emerging technologies that allow for connectivity and feedback between educators and students. The author then considers the perceptions of online learning held by both students and faculty, as well as how effective it is. After considering best practices from across many institutions and organizations, specific techniques are recommended to the United States Military Academy (USMA). USMA has special academic requirements that extend beyond the classroom and incorporate academic, physical, military, character, and leadership development. These recommendations are meant to help develop cadets through engagement via virtual platforms as appropriate. Key insights include the need to maintain personal interactions and relationships, in-person or virtually, as well as the need to produce high-quality, short video lectures in order to maximize engagement during scheduled course meeting times. Faculty members must adjust and produce content that is engaging to students to promote preparation and discussion in live, virtual sessions.

Introduction

Online learning is an area of higher education that offers great promise in the near term. As society becomes more connected through technology, the opportunity for educators to use the internet, associated devices, and applications is apparent. The US Department of Education defines online learning as "a range of activities from the effective use of digital resources and learning technologies in the classroom, through to a personal learning experience enabled through individual access at home or elsewhere" [1, p. 151]. This literature review explores online learning. First, it considers the different modes of online learning available. It then explores the existing and emerging technologies that enable educators to connect with students. The author then studies the perceptions of online learning held by students and faculty, as well as how effective it is. After identifies best practices, online learning methods are applied to USMA to help develop cadets by engaging and developing them academically through another platform.

Modes for Online Learning

Educators conduct online learning through several different modes. The ways that teachers and programmers develop online content and disseminate it to students is a contributing factor to its effectiveness. It is important to identify the main modes that institutions and organizations utilize for online learning before exploring specific technologies, the effectiveness of online learning, student and faculty perceptions, and online learning best practices. The primary online learning modes that have emerged are learning management systems (LMS), blended learning systems, flipped classrooms, fully online, and massive open online courses (MOOCs) [2, pp. 71-72]. When exploring these modes, a critical component to consider is whether instructors and students meet during live, synchronous sessions, if sessions are asynchronous and utilize recorded sessions, or if there is a combination of synchronous and asynchronous [3, p. 406]. Each mode provides different levels of interaction and benefits, which become apparent upon further examination.

LMS are online applications that offer a way for students and faculty to connect outside of the classroom environment and share educational information. The extent of LMS use varies. Some faculty use an LMS to post the course syllabus and key documents while others also utilize the assignment and gradebook features. More technically proficient faculty also incorporate discussion groups and other features offered in LMS such as Blackboard and Canvas [2, p. 71]. A common attribute across most LMS is that they are typically asynchronous tools. Document sharing, message boards, and even recorded lectures all can be accessed by students at different times throughout the day, there is often no live, synchronous interaction [3, p. 406]. LMS require little training for faculty to understand the basic functionalities and have become commonplace for both face to face and online courses [2, p. 71].

Blended learning, also called hybrid learning, combines asynchronous online learning with synchronous face to face learning. Any course that has both traditional classroom meetings and online learning components is considered a blended learning course; there is no set ratio of online time versus face to face time [4, p. 22]. Blended learning frees up classroom space and allows institutions to run courses at lower costs since some content can carry across multiple semesters and blended learning allows more students per course [5, p. 14]. Face to face discussions can carry over to the virtual setting through online discussion boards. Blog entries as well as and question/answer forums can clarify points of confusion from in-class conversations. Students have more time to reflect and answer questions posed online than in the classroom. Perhaps most importantly, blended learning requires students to work more on their own for the online portion of the class. This active learning has been shown to yield greater test performance and subject mastery [4, pp. 22-23].

Flipped classrooms are a subset of blended learning, but the rapid increase in their popularity make them worthy of examination. The underlying idea for a flipped classroom is that teachers assign students to watch recorded lectures prior to class and reserve classroom time for peer and interactive learning [6, p. 5]. Like any blended learning mode, flipped classrooms have synchronous and asynchronous components; however, this mode dictates that the asynchronous portion is content-related while the synchronous portion is interactive. This structure fosters a greater sense of community with increased interactions. Depending on the course, lab work and projects can be the primary focus of classroom sessions [3, pp. 405-406].

Fully online learning is a mode of online learning in which there is no requirement to be on campus and an instructor leads the course remotely [2, p. 72]. Fully online courses frequently utilize an LMS to manage information and classroom discussions. This mode of online learning can occur completely asynchronously, but studies have shown that it is beneficial to have a synchronous component that allows students to ask questions and interact [3, p. 406]. Institutions can realize significant cost savings with fully online courses since material can be reused and grading is often fully automated. Faculty also have time to pursue other research efforts once they develop a fully online course [5, p. 13]. Depending on the course structure, fully online courses provide significant flexibility to the students and puts the onus on them to learn the material. This increases active learning and students should show greater mastery of key concepts than they would in a traditional classroom setting [4, p. 23].

MOOCs are online courses that provide recorded lectures with some discussion and feedback mechanisms available. MOOCs are taught by university faculty for little to no cost to the student. Some traditional institutions even recommend students register for a MOOC for supplemental content [2, p. 72]. The four largest companies that offer MOOCs are Coursera, Khan Academy, Udacity, and edX. Each company has relationships with different major universities. For example, edX was started by educators from the Massachusetts Institute of Technology and Harvard University and offers courses from several other large university systems [7, p. 2]. A key component of MOOCs are the short segments that content is broken into, making it digestible and accessible for students [8, p. 1]. Although MOOCs are non-credit courses, they do often offer certificates from the sponsoring university, for a fee [2, p. 72]. MOOCs represent a potential disruption to education and online learning, where there may be a significant increase in the productivity while radically decreasing the number of educators required to produce educated students [8, p. 4].

Having explored the main modes of online learning and identifying some key differences among them, the next section considers the technologies that online learning currently relies on and what may emerge going forward.

Incorporation of Technology

Technology plays a critical role in online learning. When online learning was in its infancy, technology failures created significant resistance to widespread adoption [2, p. 29]. The ability to have robust communication and interaction between students and educators is essential to getting buy-in from both parties. This section explores the current technologies in use for today's online courses, current and emerging grading technologies, and considers the key emerging technologies required to enable online learning to continue to improve its delivery methods and expand in scope.

The current online learning environment relies heavily on technology to enable the sharing of information and to provide feedback to students. For students to interact with faculty as well as peers, the proliferation of conference call and video conference call applications has been important. These services allow for open, two-way discussions and collaboration on academic work [4, p. 22]. Virtual text chats are often paired with video conference calls to allow questions without disrupting the discussion. Students also find value in using blogs and shared file storage platforms to collaborate on group assignments [9, pp. 22-23]. Virtual classrooms and webinars bundle many tools and replicate the in-classroom experience for students. These tools include webcam sharing, screensharing, document uploading, chat room, and VoIP. Faculty use virtual classrooms to host lectures, group discussion sessions, and hold office hours. The largest constraint for these platforms is bandwidth for streaming and high-quality webcam graphics [2, p. 30]. Computer-based learning allows students to receive immediate feedback by answering practice problems and incorporating low stakes graded assessments. This technology helps to keep students accountable for remaining current with the course materials [4, p. 22]. Another technology that enables students to have the necessary content is electronic books (e-books). E-books allow students to read and reference the course textbook virtually. As technology improves, e-books are being modified to be read on mobile devices, which enables true remote learning from almost any location [9].

Providing feedback to students is essential for them to realize strengths and weaknesses. A challenge for the online learning environment is having graded assessments that enable students to demonstrate mastery that faculty can grade efficiently. Many online courses allow for larger enrollment that the traditional classroom setting. Current techniques for online learning rely heavily on online discussion forums, where students are graded for posting questions and/or answers, both for quantity and quality [6, p. 4]. Some online courses, even in the humanities, utilize multiple choice exams as the primary assessment tool. Senior professors have found multiple choice events still are "almost as good as essays…because they spot-check participants' deeper comprehension of the text" [6, p. 7]. Some online learning platforms, like edX, use computer algorithms to grade essays, but this technology has limitations and often misses the nuances inherent to writing [6, p. 5]. Cheating on graded events is more common online because students feel increased anonymity [5, p. 33]. To combat this negative behavior, online courses use plagiarism detection tools to compare submissions to databases of student papers and sources from across the internet. Remote exam proctoring is sometimes used, which requires students to take an exam at a local test center under supervision. Finally, high-tech solutions can identify cheating behavior from students. Facial recognition identifies if the user taking an exam is the student enrolled in the course. Remote lockdown of a computer can prevent the user from accessing additional information during an exam. Keystroke identification can match the unique typing pattern to a user [5, pp. 37-38]. These technologies are meant to ensure students remain honest while taking online courses and receive useful feedback for their learning.

Looking forward, a few technological advancements will contribute to an expansion of online learning. The greatest impact will come from the increase of bandwidth and wireless internet connectivity. Educators will have the ability to develop better interactive simulations to share with students. Multimedia objects are often limited for current online courses because of bandwidth considerations [9, p. 25]. Educators are also trying to use technology that connects with their student populations. Podcasts are increasingly used for instructional use, sometimes to reinforce concepts and sometimes to provide supplemental material [9, p. 23]. Efforts are underway to make online learning content more mobile compatible so students can continue to learn using devices beyond laptops. This transition is not trivial; programmers need to do significant coding and formatting work to convert online courses to mobile devices [3, p. 411]. This mobile compatibility, along with other emerging technologies, will enhance online learning as it continues to expand in the future.

Perceptions from Students and Faculty

Having explored the primary modes of online learning and the key technologies that enable it, an important question remains: what do the students and faculty think? User satisfaction is an important consideration. Despite best intentions, if students or faculty have major issues with online learning that are unaddressed, buy-in may decrease from one or both parties. The quality of the content or effort from students may be substandard, which has trickle down effects for learning and engagement. This section will explore the feedback about online learning provided from students and faculty. It highlights both the benefits and weaknesses from the two perspectives.

Students generally have very positive feedback and experiences with online learning. A 2011 survey conducted by the *Chronicle of Higher Education* of more than 20,000 students found that one-third of respondents prefer blended learning courses to the traditional classroom setting [4, p. 23]. Students enjoy the flexibility that online learning provides as well as the ability to log onto courses from almost any location [10, p. 53]. This flexibility of online learning for time and location is frequently cited as the top reason students prefer online learning to traditional methods [5, p. 9]. This links back to the idea of improving mobile technology to make online courses even more accessible. Students also like the multimedia objects that are incorporated into online classes. Multimedia is a powerful tool that helps to explain concepts in multiple ways to students and helps improve their knowledge and skills [10, p. 53]. Students appreciate the immediate feedback and interactive nature that many online learning platforms provide. This feature helps students identify the progress they are making and how well they are grasping concepts [1, p. 152]. A final component of online learning that students enjoy is the virtual community that emerges. Students initially resist participating in online discussion groups; however, over time their contributions increase and they share ideas and experiences [2, p. 20]. The small group discussions available through breakout sessions allow students to interact with an instructor and peers, creating a low pressure setting where students are more likely to engage and ask questions [11, p. 38]. Peer to peer online discussions also are popular with students for the same reason; the setting permits engagement without the pressure of many students [11, p. 39]. While students appreciate many aspects of online learning there are some characteristics that are not well liked.

Students have noted several shortcomings with online learning, most of which relate to the limited physical interaction of online courses. Traditional classrooms allow for greater interaction and discussion than virtual classrooms. Students ask fewer questions and do not feel as engaged when participating in online learning [10, p. 53]. A major contributor to this decreased interaction is the increased anonymity and lack of shared physical space provided by online learning. Some students feel less committed to the class discussions and the awkwardness that silence creates in a traditional classroom setting is not felt in a virtual classroom. While anonymity also creates the "online disinhibition effect," allowing students to share personal stories they would not share face to face, the decrease in engagement is more powerful [2, p. 34]. Expectations and requirements for students change for online environments. Students report having to increase their preparation for online courses and take more responsibility for their learning [9, p. 26]. It is important for faculty to take the time to develop polished online course content. Students have very low tolerance for substandard courses, either because of poor content or poor course design [5, p. 9]. After considering the student viewpoint on online courses, the faculty perspective also shows several benefits and shortcomings.

Faculty support for online learning is not as strong as student support. Some faculty members do enjoy the change that online learning requires from a pedagogical perspective. While being a subject matter expert is always important, online learning shifts the role of faculty members. The primary faculty role for online courses is to be a facilitator of information and engagement, who works to spark discussion and engagement. Students can re-watch online lectures if needed, but the moderating of discussions differentiates a high-quality online course from a mediocre course [9, p. 27]. Some faculty members really enjoy the focus on student interaction, and online learning puts this at the forefront. The other major benefit faculty identify

with online learning is increased flexibility. Since most online courses allow content to be reused from one term to the next, faculty members have additional time to complete research or pursue other interests after building an online course. This is especially true if the automated graded is incorporated into the course [5, p. 13]

Online learning has several shortcomings that faculty identify. The most common issue is that faculty find online classrooms to be foreign settings, whereas they are practiced and comfortable in a traditional classroom. Shifting online takes significant commitment [2, p. 45]. Faculty members frequently do not know how to utilize the online features that a platform provides, limiting the quality of an online course. Sometimes the issue stems from a lack of confidence employing new technologies, other times the issue is that faculty are skeptical about the efficacy of online learning [1, p. 155]. Some faculty members go so far as to say that "online learning will corrupt the quality of higher education" [2, p. 79]. There is no supporting evidence for this, and once resistant educators experience and teach an online course, they often become vocal supporters of online education [2, p. 79]. Faculty often romanticize the traditional classroom setting [2, p. 49], claiming that online learning leads to decreased personal relationships with students. While this may be true for small seminar courses, many traditional undergraduate and graduate courses have hundreds of students and the personal interaction is very limited [2, p. 52]. A final issue that many educators identify with online learning is gauging student mastery. Unlike a traditional classroom, the online setting creates difficulties seeing student motivation and/or confusion. The online environment eliminates the ability of faculty to monitor body language and seek feedback through non-verbal cues [5, p. 177]. To compensate, educators utilize online tools such as breakout groups and surveys, but certainly some useful non-verbal feedback is lost when going online.

Having considered how students and faculty view online learning, the next section will survey the effectiveness of online learning, especially when compared to the traditional classroom setting.

Online Learning Effectiveness

There is some hesitancy in the academic world about how effective online learning is for students. The previous president of Stanford University, John L. Hennessy, stated clearly the goal for online learning: "While the gold standard of small in-person classes led by great instructors will remain, online courses will be shown to be an effective learning environment, especially in comparison with large lecture-style courses" [6, p. 3]. It is important to note that most educators hold the traditional classroom setting to be the standard to which online courses should be compared. However, John Hennessy differentiates large lecture courses from small seminar courses. The difference is significant, since the efficiencies and cost savings achieved through online learning will more likely impact lecture-style courses than smaller courses.

Researchers and educators have sought to determine online learning's effectiveness in a multitude of studies. The United States Department of Education considered the results of many years' worth of data to identify if any overall trends emerged. The researchers ultimately drew two major conclusions. First, they found that "online delivery produced a statistically significant, small-to-moderate-size advantage for learning" [5, pp. 30-31]. This conclusion stands in contrast

to the commonly held belief of faculty that online learning leads to decreased quality of education. The second finding was that "blended course design – i.e. courses that combine online and face-to-face components – produced particularly good outcomes, compared to fully online and completely face-to-face courses" [5, p. 31]. The Stevens Institute of Technology performed a study where a professor taught a traditional version of a course and an online version of the same course. To eliminate any bias, the same exam was given to both populations. The grades were virtually the same for both courses [2, p. 98]. Researchers ran a large study in Scotland to determine if having optional online materials would have an impact on student performance. This "optional blended online program" also yielded positive results for students who used the available online resources compared to those who did not. Although increased performance varied by subject area, all areas had performance increases among those students who used optional online materials. Students commented that this online course structure allowed them to find that materials that fit their learning styles and preferences, and they were more likely to prepare for class [1, pp. 153-154]. The above studies make it clear that online learning should be considered as effective, if not more, than traditional classroom learning. One major issue is that performance and effectiveness are typically measured using academic grades. Additional longitudinal research is necessary to determine if students have similar retention rates and mastery for content learned online versus learned in a traditional classroom.

All signs indicate that online learning is not a lesser form to transmit information than traditional classroom learning as far as student performance is concerned. With that in mind, it is worthwhile to explore the best practices that are successfully being employed online. Highlighting these practices is beneficial since various institutions and faculty members employ different methods and tools to achieve success. Summarizing these techniques is a valuable endeavor.

Best Practices for Online Learning

Researchers and institutions have worked to identify and codify best practices for online learning. The topic areas and techniques are wide-ranging. Generally best practices can be naturally grouped into several categories: teaching style, student roles and responsibility, feedback, and multimedia. Best practices for these areas are summarized to highlight how to best focus efforts for online learning implementation for higher education.

When shifting from a traditional to blended or fully online learning model, faculty members must adjust their teaching styles. The traditional classroom setting lends itself to passive learning; a teacher lectures and students listen. Online learning requires a more "constructivist model," where students more actively participate and learn concepts [1, p. 154]. Faculty should shift their mindset and attempt to become empathetic facilitators. In an online environment, the emphasis is less on the teacher's delivery and more on the student's ability to understand material. Faculty must be willing to work with students at a more individual level as needed [1, p. 155]. Online learning requires teachers to be "far more engaged than in the classroom" [2, p. 7]. The lack of shared physical space creates the need for additional questions and discussions to be initiated by the teacher. In a traditional classroom setting these would occur organically, but online, there must be a concerted effort to engage students. Tied to the idea of active learning, faculty members teaching online courses should consider implementing more

case-based and problem-based learning. These methods require more student collaboration and active learning than traditional lectures [9, p. 27]. Scaffolding in the online learning environment is important, as it has been shown to increase student motivation and confidence. Building on previous knowledge helps students to grasp new and more complex concepts and is directly tied to higher online course completion rates [11, p. 36]. For faculty members to successfully adjust teaching styles, they may require some additional training to be comfortable in the new online learning environment. A training course in online learning could focus on both the pedagogical and technical skills required. This would help build faculty expertise and confidence in the systems making the transition smoother for all involved [3, p. 407]. Just as faculty members need to adjust their teaching styles, students must adjust their learning styles.

Online learning changes student roles and responsibilities compared to the traditional classroom. As discussed, the online environment puts more emphasis on active learning. A significant component of online learning is the peer-to-peer learning and discussion that occurs. Students need to contribute to online discussions and be interactive to become part of the virtual classroom and community [11, pp. 38-39]. Students must use available tools (e.g. discussion boards, blogs, chat groups) to clarify points of confusion, else they risk falling behind in the class [4, p. 23]. A major benefit that students experience from asynchronous online discussions is additional time. Unlike the live classroom discussion, chat forums and discussion boards are unbounded by time. This allows students to reflect, ask more thoughtful questions, and give more developed answers [2, pp. 41-42]. Online learning does require students to put in more preparation for lessons and assignments. This is likely because faculty members lack physical interaction with students and cannot read body language and non-verbal cues, so they cannot gage student comprehension as well with online learning [9, p. 26]. While students have increased responsibilities for online learning, they also require increased feedback to stay engaged and monitor progress.

Feedback for online learning is critical for student success. Students value immediate feedback, and this is best accomplished through automation in the LMS [1, p. 152]. Rather than have a large, end-of-semester project, online courses should offer many opportunities for quick feedback. Having many small stakes assignments that continually build upon each other puts the onus on students to stay engaged and current with all course material. Researchers recommend breaking large assignments into smaller segments; this allows for faster grading and more feedback to students. Additionally, rubrics and grading schemes should be transparent to students so they fully understand expectations [5, pp. 179-182]. Another way to incorporate feedback is through gamification. Incorporating game-like qualities into online courses provides timely feedback and keeps student engagement high. The best way to gamify a course is to build a running narrative that links course objectives and has many opportunities for small successes throughout. Questions should be not too easy nor too difficult, and a leaderboard with top performers can motivate students to master course material [5, pp. 188-193]. By increasing feedback to students, they will engage more in discussions and become more active learners. Similarly, effective use of multimedia has significant impact on student performance.

Unlike most traditional classrooms, multimedia can be prominently featured in online courses. Multimedia can include text, audio, video, animations, and simulations, all of which have purposes and contribute to learning. Researchers have developed the "multimedia

principle," which states "that adding pictures – or diagrams, or other similar representations – to text produces enhanced learning compared to text alone" [5, p. 153]. Research supports graphics and text because of the distinct modalities being used by the student. When animations or video is paired with text, the student becomes distracted and cannot internalize all the information. A better technique is to pair animations with audio. [5, p. 153]. Another best practice for multimedia is segmentation. When producing videos or recorded lectures, students are more likely to understand and watch all material if it is broken into digestible segments [5, p. 155].

Applications to USMA

Having explored online learning for higher education, there are several key concepts that directly apply to USMA. While I do not expect USMA to go to a fully online teaching model, I think some efficiencies and advantages can emerge by implementing a more blended approach to course delivery. Having taught courses online for part of the spring 2020 academic semester, as well as for the Summer Term Academic Program (STAP), I fully expect USMA faculty to utilize online resources more going forward. To teach courses in a blended manner, a few key concepts found in this literature review need to occur. My recommendations are to have a more robust faculty training program for online course delivery, to identify best practices for online course design, and to increase use of online learning for cadets who need support.

As an incoming USMA faculty member there is a requirement to attend the department-run faculty development workshop (FDW). This program runs for several weeks and orients new faculty to USMA, provides access to available resources, and allows the opportunity to "practice teach." I recommend that a part of FDW include an introduction to online teaching, beyond how to build a Blackboard page for an academic class. Some instruction on managing student discussion, building course materials, and delivering content online would be extremely beneficial. There may even be an opportunity to teach one practice lesson remotely. If incoming faculty have a good experience with the online learning introduction during FDW, a follow-on program could perhaps be offered by the Center for Teaching Excellence (CTE) or through a third-party organization. Some faculty members may have a proclivity toward building great online course content and having some training and certification in this area would be a great benefit to themselves and the cadets.

USMA is working to capture best practices from the online learning that they shifted to for the spring semester of 2020 due to the COVID-19 pandemic. Having a repository for best practices is extremely beneficial. Based on the research, a few best practices should be highlighted. First, the idea of segmentation is important to highlight. I have personally made some recorded online lectures for my courses that have exceeded 60 minutes. By implementing the principle of segmentation, I would have made this content more digestible for students and more likely that students would fully watch the content. Emphasizing the importance of segmentation is important for faculty building online courses. Videos should not exceed 10 minutes. Another best practice is gamification. By incorporating rapid feedback, a long-running narrative, and a leaderboard, students are more likely to engage and complete online courses. Gamifying a course in a coherent way can take a significant amount of time, but the results are worthwhile from a student engagement and content mastery perspective.

A final, more immediate way that faculty can apply online learning is to support cadets who need additional attention. USMA has several populations of cadets that can benefit from online learning. Corps squad athletes miss a percent of academic classes to travel for competitions. Online materials or online additional instruction with instructors can help them stay current with course materials. Some cadets struggle to grasp content and risk falling behind in classes. Additional instruction, online simulations, and immediate online feedback can help these cadets better understand material outside of traditional office hours. Other high performing cadets can benefit from supplemental online content that challenges them beyond typical course expectations. In all cases, leveraging some aspects of online learning benefits cadet develop, which is ultimately the goal of USMA.

Conclusion

Online learning can provide great benefits in addition to the traditional classroom environment. There are multiple modes of online education, from a straightforward LMS that allows for document sharing to fully online, asynchronous MOOC that allows for global participation and engagement. New technologies encourage discussion and student engagement as well as provide rapid, meaningful feedback. Students generally have very positive experiences with online courses, and studies show that academic performance is at least as good as performance in physical classrooms. Faculty members have some trepidation about the shift toward online courses, but training programs and the use of blended programs can assuage any concerns. Going forward, USMA is positioned to increase its use of online learning. The increase in online education will provide another avenue to teach, mentor, and inspire cadets as they prepare themselves to become leaders for the nation.

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