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WWC: Leveraging Extreme Events in Teaching

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Abstract

2022 opened with World War C, the first major cyber world war. Wanting to capitalize on history in the making, Information Systems faculty are integrating real time events to increase student engagement, comprehension, and application of IS concepts. This paper outlines a successful midterm evaluation pivot that leverages current events. We discuss two different actions taken and objectives, outcomes, and implications for teaching and educational research. We find that incorporating extreme current events motivates students towards self-learning and creative knowledge outlets, which in turn stimulate greater comprehension, application, and retention across the entire class.

Keywords: pedagogy, teaching extreme events, MIS teaching and learning, Ukraine war in teaching

WWC: Leveraging Extreme Events in Teaching

Jordana George and Parisa Aasi

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1. INTRODUCTION

2022 opened with World War C (WWC), the first major cyber world war. Ostensibly between Russia and Ukraine, it has drawn in both physical and cyber combatants from across the globe. These participants include corporations such as Microsoft and Tesla, hacktivists such as Anonymous, and international volunteer soldiers fighting in person and online (Burgess, 2022; Chirinos, 2022; FightForUA.org, 2022; Gordon, 2022; Pitofsky, 2022; B. Smith, 2022).

The unprecedented spectacle of a war mediated through computer technology has presented IS educators with a treasure trove of compelling real-life examples in systems design and implementation, AI, cybersecurity, internet and systems access, autonomous vehicles, and fake news among others. The first war to be so completely fought on social media has also enabled some of the highest levels of transparency and lowest levels of information asymmetry ever seen in armed conflicts. One can only imagine what a WWII general would think about the ability to monitor troop movements in real-time on a webpage or watch guerillas tossing Molotov cocktails at tanks.

This new visibility not only keeps the public's attention level high but provides myriad examples for a range of IS classes and topics.

Today, it is critical to understand the information systems aspects of a war that has been continuing for over 600 days. Cyber security, responsibilities of different IS involved parties and social media can be topics worth of study in this case (Willett, 2022).

There are many different and novel ways of making students familiar with cases of current events that can be relevant to their course topics such as using metaverse and AI platforms (Baidoo-Anu & Owusu Ansah, 2023; Hirsh-Pasek et al., 2022). Innovation in running classes in MIS is a key to make classes updated and teach the students to be able to use their knowledge in the new world dealing with new challenges every day (Numonjonov, 2020)

Vivid social media-shared videos of civilians driving tanks or making homemade napalm or singing "Let it Go" in a bomb shelter have made the war relevant, personal, and accessible to any student with a smartphone or computer. The authors decided to capitalize on this phenomenon to engage students and provide deeper understanding in their IS coursework.

Two classes were selected to implement the course plan pivot. First, an undergraduate Management of Information Systems class was targeted for a revised midterm evaluation. This course was a mandatory upper division class for MIS majors and covers general MIS topics. The second course was a master's level elective course on Managing the Technology Organization and the revised assignment was a self-directed learning exercise (SDLE). This course, taught seminar style, focused on the unique management issues facing technology firms and departments. The objectives for both classes were similar: encourage students to do a "deep dive" into an IS topic of their choice that relates directly to the Ukraine-Russia conflict of 2022.

Our qualitative measurements for success included increased student engagement, greater class participation, greater concept comprehension, and increased retention.

The outcomes from both classes were successful, based on classroom observations. Student interaction during class increased as they agreed, disagreed, and piggybacked onto each other's ideas. Reticent and introverted students were able to participate more fully. Last, students demonstrated greater critical thinking skills as they took concepts learned earlier in the semester and applied them with their current projects.

Grounded in the research on teaching with current events, self-directed learning, and multimedia assignments, this paper contributes to IS education through two examples of pivoting course plans to leverage current events and provides practical assignment details that educators can duplicate or modify for use in their own classrooms. The paper next proceeds with a review of the relevant literature, descriptions of our course modification case studies, the outcomes, and implications for IS education and related research.

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2. LITERATURE REVIEW

Extreme Events in Teaching and Learning

Instructors have capitalized on current events for generations, yet few institutionalize the practice. Current events hold students' interest and provide real-world examples of classroom concepts (Cornely, 2003). The key characteristic about current events, particularly extreme events such as natural disasters, wars, and the like, are the human stories embedded within. It is these stories that stimulate student interest. Buffo (2015) and Pomykalski (2015) suggest four benefits of using these eventful stories in the classroom:

1. Grab student attention and make them focus on the class topic.
2. Prepare a fertile environment for engagement and discussion.
3. Build the connections between students and between students and the instructor.
4. Give quieter and less demonstrative students an opportunity to participate.

Teaching critical thinking

There is not much attention from the university faculty and educators to the fake news spreading around when an extreme event happens in the world. Weiss et al. (2020) suggest in their research that the faculty use different methods for education to teach the students recognize the fake news through the critical thinking. This shows how important it is for the faculty in IS to teach critical thinking skills to students, since IS is being used for coverage of all extreme events and analyzing the data these days.

Self-Directed Learning

Self-directed learning was first promoted in the 1960s and 70s and was primarily focused on adult learners (Ross-Gordon, 2003). However, we support the position that many of the principles of self-directed learning are appropriate for today's relatively sophisticated and globally-aware college students (Douglass & Morris, 2014), especially in technology majors where traditional learning may not adequately prepare students to step directly into industry roles. There are indications that classroom learning in technology skills may not transfer well to real world scenarios, decision making, and problem solving (Connolly & Begg, 2006). Self-directed learning, however, may be an antidote to these issues in our quickly changing environment, providing greater student engagement, motivation, comprehension, and retention (Morris, 2019).

There are several tenets to self-directed learning: 1) Self-directed learning views the instructor as a knowledge guide rather than a source or provider of knowledge; 2) Students are made aware that they are capable of creating knowledge; Students want to provide input as to how/what they learn; 3) Students are presumed to have internal motivations to learn, if they can be stimulated to activate it (Ross-Gordon, 2003; Tough, 1989); 4) Student autonomy in learning results in increased "autonomy, competence, relatedness, or purpose" (Douglass & Morris, 2014, p. 14); and 5) A goal of self-directed learning is student self-actualization (Morris, 2019).

Collaborative Learning

Collaborative learning encompasses a series of teaching methods that involve "joint intellectual effort by students, or students and teachers together" (Smith & MacGregor, 1992, p. 2). These methods may include group discussions, team projects, or student co-teaching (where students instruct each other). In collaborative learning, instructors are not purveyors of knowledge (similarly to self-directed learning) but change agents and guides (Bruffee, 1999). The tenets of collaborative learning include: 1) Learning is active, not passive, and in the best learning situations students create something; 2) Context is important and activities are grounded in problematic conditions to stimulate practice, analysis, and solutions; 3) Students each learn differently and bring diversity of perspective to the classroom which enhances learning; and 4) Social learning that involves a good deal of student interaction stimulates student engagement and "meaning-making" (Smith & MacGregor, 1992, p. 4). One particular form of collaborative learning is peer teaching, where students teach other students. The primary benefits of peer teaching include increased participation and proactive learning, and greater skills development (Goldschmid & Goldschmid, 1976). The involvement of students in the class through the discussions about different aspects of a specific topic and using different resources, makes them feel more engaged and also teaches them how to communicate as a team and share their findings (Heilporn et al. , 2021). This makes the students more engaged, makes the course more interesting, creates a trustful collaboration between students and helps them to analyze a topic through many different aspects of it.

3. CASE STUDIES

Pivot I: Midterm Exam
Required general MIS courses are common in business schools. Some business schools

Midterm

You will research an MIS aspect of the Ukrainian - Russian war of 2022, submit an essay, and give a minimum 5 minute presentation on your topic in class on March 10 using at least one slide. Therefore, you will have two deliverables in Canvas: your essay and at least one slide to be used in your short presentation in class. Combine them into ONE PDF file for submission.

The essay should be a minimum of 400 words. There is no maximum. You may use any sources, but be sure to credit and cite your sources, use quotation marks when quoting directly, and avoid plagiarism. You are encouraged to use graphics, charts, images, tables, or other media.

Use a 12 point font, Ariel or Times or similar. Use 1" margins. Add a header with your name, title, and page number. Your presentation slide(s) should be clear and to the point. You must have at least one slide but you may have more. Don't overcrowd and use plenty of white space. You can link to show a short video during your presentation but it should not be more than 2 minutes, unless it is you in the video. If you prefer, you may pre-record your presentation and play it in class. Video format styles can include a news report, TED Talk, original skit, etc. It is open for creativity. Just make sure the topic is relevant to MIS and the war.

Table 1. Midterm Instructions

stipulate the course for all BBA students while others require it only for IS majors. As a required course, it is often difficult to modify because of required teaching objectives. General MIS courses are often among the first prerequisites for later IS classes, and also frequently offer multiple sections.

This particular course had a midterm exam and a final. Both were a combination of 25 multiple choice questions (mostly on definitions and terminology) and an essay question (integrating and synthesizing concepts). In light of the recent Ukraine-Russia conflict, the instructor made two changes. First, the traditional in-class midterm exam was exchanged for a new one-week midterm project containing an essay and a short in-class presentation to be given on the original exam date. Second, the last class before the exam day was given over to review in the form of an in-class Jeopardy game on terms and definitions (JeopardyLabs, 2022).

Students were given a week to complete the project. The instructions given are presented in Table 1 and the grading rubric used for the assignment is provided in Appendix A.

Pivot I Outcomes

Project topics were quite varied, although, understandably, cyberattacks (in general) covered a third of the submissions. While many students discussed cyberattacks in general, several opted to dig into specific types of attacks, such as wipers. The prospect of tech firms and fintech cutting ties with Russia was also a popular topic as students explored ethical dilemmas, risks, and potential outcomes. This included essays on firms in general, as well as deeper views into specific companies and the impact of their leaving. AI and its various aspects, such as disinformation, deep fakes, autonomous drones and vehicles (both on land and submarine) was another popular topic. Several students looked into actions that specific firms were taking in the war, serving as privateers if you will, such as Microsoft and Starlink. The hacktivist group Anonymous garnered special attention from a few students, while others focused on societal impacts of the digital war. Table 2 summarizes the project topics.

The presentation part of the midterm resulted in variety, as well. The types of presentations ran the gamut from a single slide with bullet points from which the speaker lectured to seven minute pre-recorded videos. Some of the standout presentations included "TedX Ukraine" - a Ted Talk style video, an employee cyber awareness video (for a fictional company) on cybersecurity protocols and company IT strategy during the war, a presentation with accompanying slides and video on social media in war (including emotional video of children singing in bomb shelters), and detailed exposés on AI powered military equipment. Table 4 summarizes the types of presentations, which include Video, Presentation with complex slides/media (the most popular), and Presentation with simple slide(s). Note that some students were able to give compelling presentations because of their deep topic knowledge despite using only a few simple slides.

Topic	# of Submissions
Cyberattacks as part of warfare strategy, cyberterror counter warfare	10
Tech firms cutting ties with Russia, fintech & electronic payment services terminated, social media platforms leaving	5
Digital disinformation, AI & disinformation	4
The role of AI in warfare, weaponized AI, autonomous vehicles	3
Russia's Heremitic Wiper Attack - Malware	2
Anonymous, hacktivists	2
Starlink	2
Everybody participating in the war (states, firms, individuals)	1
Microsoft's counterwar on Russian cyber attacks	1
Digital iron curtain	1
Ethical questions of social media platform moderation in times of crisis	1
Social media & modern warfare	1
Digital communication & transparency in modern warfare	1
TOTAL	34

Table 2. Project Topics

Student engagement was observed to be higher than normal during this project, both in the week of preparation (the instructor received a number of requests for feedback on the choice of topics) and in the resulting submissions. A number of students who had been performing satisfactory "B" work were able to bump their grade with an "A" level midterm, thanks to their increased engagement with the topics and opportunity to self-learn. Unfortunately, there are always a few who do the minimum and this course was no exception, but it was only a few people.

A favorable outcome of this revised midterm was the ability to not only evaluate where students were in terms of comprehension and retention but also how they applied critical thinking and used analysis skills developed during the first half of the semester. The fictional employee cyber security seminar video is an example of this. The student approached the project as a video to be distributed to employees of a fictional firm. The objective of the video in this context was to apprise staff of the organizational cyber risks

posed by the Ukraine-Russia war, how it might impact the company, precautions employees should be taking, and steps the company was taking to mitigate risks. The student organized his presentation as follows in Table 5.

Presentation Types	
Type	**Count**
Video	6
Presentation with complex slides/media	18
Presentation with simple slide(s)	10

Table 3. Presentation Types

Another student organized her project as a case analysis of social media in modern warfare. Her table of contents is shown below to illustrate the level of organization applied, as shown in Table 6.

Current Situation:	● [Forbes video](#) "How Hackers Are Waging A Cybersecurity War During The Ukraine-Russia Conflict" ● How the situation affects our company
Short Term Plan	**Long Term Plan**
Steps to be implemented immediately to reduce the risk of being the victim of stray cyberattacks, directed or otherwise.	*How we plan to improve our information security and risk management in the long run.*
Employees ● Watch out for suspicious emails/links ● Phishing is still the #1 cyber scam ● Password diligence **Company** ● Coordinate with industry/law enforcement ● Establish alternative communication channels ● Implement no retaliation policy for employees reporting security lapses	**Consultants** ● Bring people in to eval. our info security ● Implement their recommendations **Cyber Incident Response Plan** ● Business continuity plan ● Have processes in place should we go offline **Continued relationship with industry & feds** ● Communicate with industry peers ● Get on mailing lists of CISA and FBI **Examine supply chain** ● Phase out Russia reliant code ● Carefully vet source code and engineers

Table 4. Student Video Organization

Table 5. Student example of case study format

An example of the format that students use for writing their case analysis is presented in Table 6.

Term or Concept	Definition	Example	Sources & Citations
Essay (150 words minimum)			

Table 6. SDLE Template

A third example is a traditional essay totaling around 1350 words (the assignment minimum was 500 words). The student spent considerable time researching many aspects of digital disinformation, providing appropriate definitions, examples, references, quotes, and graphs. The corresponding presentation incorporated all this and more in a compelling talk. All these examples demonstrated creative, personal choices in how students approached the subject, synthesized the learned material, and applied it.

Another benefit of this pivot resulted in increased class participation and interaction. When students teach other students about these current topics, attention is high. In most cases, students jumped in with questions for the speaker and often this would lead to the speaker accessing additional impromptu material on screen, such as a relevant YouTube video, newscast, website, or Twitter post. In one presentation on AI, the discussion turned to fake images created by AI and the speaker immediately advised the class to use their cellphones to access https://this-person-does-not-exist.com/, a website that generates random AI Photos of (not real) people. Upon accessing the site, each person would see a different highly believable image. The entire class participated, accessing the site and showing their phone around with varied realistic images of babies, old women, young men, etc. The discussion then evolved into how fake images like these can be identified and the class joined in pointing out flaws in the various images.

While some of the speakers were extroverted and good presenters naturally, there are always some shy students who don't do well in presentations. By allowing students to present a prepared video instead of a live presentation, these shy students were still able to participate fully. Many used their new medium creatively and effectively, going over and above a traditional "talking head' narration of a PowerPoint recorded on Zoom.

Pivot II: Self Directed Learning Exercise
A commonly used assignment that promotes independent development is the Self Directed Learning Exercise (SDLE) (Mawdesley & Al-Jibouri, 2010). In our case, the masters-level Management of the Technology Organization course requires weekly SDLEs. The template includes a definition, real world example, and a short essay describing the phenomenon in the student's own words. The template is illustrated in Table 7. SDLEs are typically used in our classes as a complement to more structured work and instruction, such as textbooks or lectures. The SDLE encourages students to find a particular

aspect of the topic at hand that interests them and gives them the opportunity to explore it in depth. SDLEs are submitted for grades each week but are also used for class discussion, allowing students to share what they learned. The interesting thing about this exercise is that even when students select the same term or concept, how they approach it often differs considerably. This variance gives students the opportunity in class to see how taking a different perspective, changes how an issue is perceived.

SDLEs are supposed to be submitted by students every week about the MIS topic of that week. The students need to provide resources for their essays and make sure those resources are relevant. In the same week, the students get to present their SDLE's in the class and there will be an open discussion opportunity for all students to share their SDLE's. Finally, the resources used by different students are shared through the course webpage.

Pivot II: Outcomes

The pivot for SDLEs directed students to focus on MIS aspects of the Ukraine-Russia war. These resulted in varied topics, such. as the role of private technology firms in supporting Ukraine, Ukraine's internet military recruiting strategy, and hacktivist participation in the war. One of the more interesting SDLEs compared Russian cyber-attacks on Ukraine to ancient Greek armies lobbing dead cows over city walls to sow fear and panic. We also noticed an increase in average essay length for these SDLEs compared to other weeks. Normal weeks averaged 150-175 words, however, the current event SDLE essays averaged 200-250. Last, there was an increase in class discussion around the SDLEs as students listened and then offered another example of the phenomenon or refuted it as fake news (citing verification websites and sources). These lively discussions helped drive home the concepts, increasing both comprehension and retention. In general, pivot II lets the students to freely search and present topics relevant to MIS aspects of Ukraine-Russia war. In these SDLEs every week they did the same for that week's topic. However, this week, the students showed more interest and found it challenging. They had to find reliable sources and distinguish correct news. Presenting those SDLEs in the class was also very engaging since different aspects of the topic and similarities and differences between different sources could be compared.

4. DISCUSSION AND IMPLICATIONS

This paper illustrates how current extreme events may be leveraged to increase student engagement and improve student success in IS courses. Maintaining relevance is critical for all educational fields, but we suggest it is even more important for IS education, as technology changes so quickly. Instructors in IS courses must be diligent in keeping course material up to date and in line with industry expectations or risk poor student outcomes in terms of job placement, starting salaries, and department reputation. Incorporating current events, especially critical events such as war, not only increases course relevance but also significance and value. It provides students with new practical knowledge, new theoretical knowledge, and broadened perspectives on the role of IS in a greater context. It also gives them additional material to discuss in job interviews and recruiting events.

Another aspect of these pivots is that students quite simply enjoy them. While there may be a few students who dislike changes in the syllabus, most are excited about the opportunity to explore historic events through the lens of class subjects. It increases course relevancy and demonstrates course value in a tangible way. Students see firsthand that what they are learning has real world applicability and worth. While the Ukraine Russia war has offered a plethora of IS topics for study, it is not unique. Past events have been utilized by faculty in the same way. The recent Covid-19 pandemic, for example, has provided a number of opportunities. These include essays, reports, data analysis and visualization assignments using a range of open Covid data sources. Topics included open data and digital epidemiology, the ethics of digital tracking and monitoring of populations during pandemics, the rise of work-from-home and digital communication technologies, and the role of social media in public sentiment about the pandemic. In short, when pivoting to current events, the following steps can be taken.

1. Identify the current event. Provide a clear scope of what is and is not to be included.
2. Identify how students can approach the current event in their assignments. This might include regular assignments or assessments such as a midterm or final.
3. Explain why you have chosen to make this course plan modification and the benefits you anticipate from it. Try to get the students excited about it.
4. Provide examples for students and offer suggestions as to the different formats or media you will accept.
5. Encourage a range of submission types so that every student can find a format they are comfortable with and can then focus on their best work.
6. Provide a clear rubric for grading.
7. Consider providing a longer preparation time than usual. For media and presentations, at least a week of preparation is recommended.

5. CONCLUSIONS, LIMITATIONS AND FUTURE RESEARCH

Educators are always challenged to maintain student engagement and keep courses relevant. Utilizing current events, especially momentous events, provides a unique opportunity to analyze history in the making through the lens of your course subjects. Such analysis enables students to place their coursework in a greater context and stimulates intellectual achievement and engagement. Through this assignment the students with MIS background learn to understand the role of MIS in the extreme events in the world of today. This brings a new insight for students since most global companies using MIS can be affected by such events. Using principles from both guided independent learning and collaborative learning, pivoting courses to leverage current events offers IS instructors another tool for ensuring student success. Some limitations in this study are that the extreme event used in the class is vastly dynamic and information about it changes every day. Also, there might be many aspects of such events that can be missed while studying due to confidentiality and incorrect news spread from different sides in a war.

For future research, we suggest using other current events, advances and concerns in AI and communication systems security during extreme events as cases in the class to make the students interested and prepared for their potential future jobs.

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Appendix A

**Essay and Presentation
Rubric**

Criteria	Pts
This criterion is linked to a Learning Outcome Minimum requirement met The minimum word count and slide count have been met. If the submission exceeds the minimum significantly, extra points may be awarded.	5 pts
This criterion is linked to a Learning Outcome Relevance & Substance The topic is relevant to the assignment and is supported with real world examples to support the author's opinions.	75 pts
This criterion is linked to a Learning Outcome Mechanics The submissions are written with good grammar and are devoid of typos and other writing errors.	10 pts
This criterion is linked to a Learning Outcome Format & Style The submissions use the described format requirements, slides are clear and not overcrowded, images are cited. If the submission goes over and above, extra points may be awarded.	10 pts
Total Points: 100	