The Community Outreach Model of Service-Learning: A Case Study of Active Learning and Service-Learning in a Natural Hazards, Vulnerability, and Risk Class

Brittany D. Brand,[a] Kara Brascia,[a] and Margaret Sass[b]
[a] Boise State University, Boise, Idaho, USA. [b] College of Southern Idaho, Twin Falls, Idaho, USA.

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Abstract

The popularity of service learning is increasing, especially at a time when college students want to make a greater impact in their communities. However, service learning has not been extensively assessed in courses based in science, technology, engineering, and mathematics. This article provides a case study of how incorporating service learning through a community outreach project can increase student engagement, enhance the depth of understanding of a given topic, build communication and teamwork skills, and contribute meaningfully to the students' community. This article shares how the instructor of a natural hazards, vulnerability, and risk course implements service-learning through a community outreach project and provides evidence for how such outreach can enhance student learning and address the common problem of student apathy and disengagement. Through this case study, the authors design, implement, and test a new model for community outreach-based service learning and discuss the transferability of this model to other science, technology, engineering, and mathematics and social science courses.

Keywords: community outreach, reflection, active learning, service-learning

Introduction and Study Objectives

Active learning is an education strategy in which students engage in activities such as group work, group discussions, reflections, and problem solving to deepen their understanding of content (e.g., Bonwell & Eison, 1991; Prince, 2004). Active learning is effective because it addresses different learning needs, reinforces critical thinking and decision-making skills, boosts learner motivation and performance, and creates a strong sense of community through peer-to-peer interaction (e.g., Pappas, 2015; Prince, 2004).

Service-learning, which falls under the umbrella of active learning, is an experiential pedagogy where students work with community members to enhance their learning (Casile, Hoover & O'Neil, 2011; Knapp, Fisher, & Levesque-Bristol, 2010; Levesque-Bristol Knapp & Fisher, 2011; Zlotkowski, 1996). Students engage with a community partner through projects that benefit the community while learning course material. Service-learning improves critical thinking, problem solving, and communication skills and promotes a deeper understanding of the learning process (Levesque et al., 2010; Molee, Henry, Sessa, & McKinney-Prupis, 2011; Vogelgesang & Astin, 2000; Warren, 2012). It also enhances learning by teaching students how to apply concepts from their classes to external situations (e.g., Markus, Howard, & King, 1993). In fact, studies show that service-learning improves depth of understanding of course concepts more than traditional research projects (e.g., Casile et al., 2011).

Author correspondence: brittanybrand@boisestate.edu

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Due to its proven efficacy in enhancing learning, service-learning is becoming more widespread in higher education as a high impact practice (Kuh, 2008). However, service-learning is not yet widely used in courses based in science, technology, engineering, and mathematics (STEM). As such, the efficacy of using service-learning to enhance student engagement and understanding of content in STEM courses warrants further investigation.

The objective of our work is to explore the combination of active learning and service-learning as pedagogical approaches to (a) increase engagement and (b) improve content comprehension in STEM courses. For our case study, we incorporated service-learning into a 300-level interdisciplinary Boise State University undergraduate course called "Natural Hazards, Vulnerability, and Risk," which included eight students from a variety of majors. The entire course is based in active learning. However, only the last 10 weeks of the course incorporates service-learning. Assessments immediately before and after the service-learning component allows us to address the following questions:

- Does the implementation of service-learning increase student engagement with course material?
- Does the addition of service-learning improve comprehension of course content?

Because our course focused on natural hazards and risk, we also ask the following questions:

- Does the addition of service-learning allow students to develop positive attitudes toward the efficacy of taking risk-reducing actions (e.g., household preparedness actions; building a vehicle emergency kit)?
- Do students recognize how an individual's role in risk reduction promotes whole-community resilience to the potential impacts of natural hazards?
- Does the addition of service-learning increase students' sense of responsibility to share their knowledge with the community in which they live?

Methods: Developing a Community Outreach Model of Service-learning

To address these questions, we developed and implemented a community outreach model of service-learning. This model is designed to be transferable to other STEM- and social-science-related courses. The steps for implementation are as follows (illustrated in Figure 1):

1. Students learn content they will eventually share with the community.
2. Students identify and apply how the course topics relate to a specific population or geographic area in their community. Community partners help students understand this connection, answer students' questions, and help students reflect on why educating the community about the issue is vital.
3. Students perform a community needs assessment by investigating the current level of community knowledge or awareness through surveys or other indicators.
4. Students explore strategies to increase community awareness and promote a desired behavior change through a sociological or communication lens.
5. Students review and critique current community outreach materials used to increase knowledge or raise awareness of the target group(s).
6. Students document knowledge and insights gained from Steps 1–4 and offer these, along with recommendations, to the community partner(s).
7. Students design creative approaches to communicate with their target group, motivating personal and/or community action.
8. Students collaborate to develop outreach materials, assessments, and an implementation plan with feedback from their peers, instructor, and community partner(s).

9. Students pilot the outreach materials and use a pre- and post-test to evaluate their success.
10. Students prepare and present a report and oral presentation to the class and community partner. Additionally, the students provide the community partner with materials, data, and final reports (if applicable).

Steps 1 through 3 prepare the students for service-learning. Step 4 is where the students begin developing their service-learning projects. To be successful, this community outreach model needs to be a central and significant part of a course.

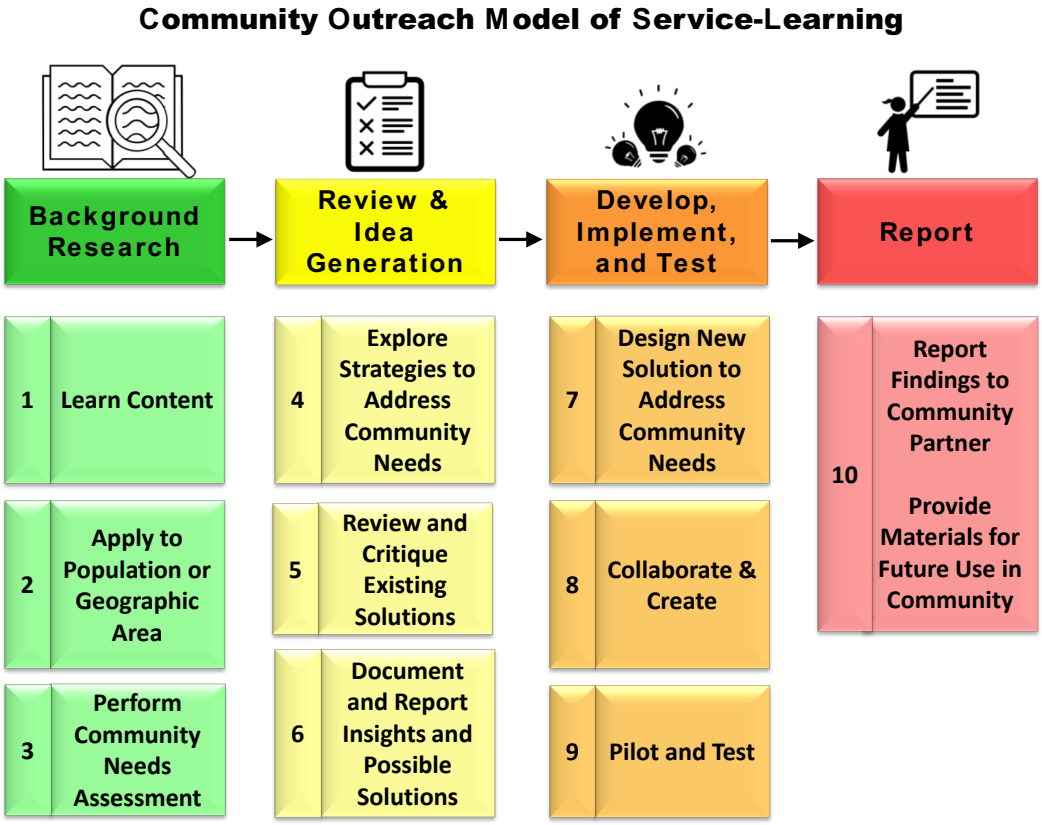

Figure 1: Illustration of steps to integrate the community outreach service-learning. Research, Idea, Test, and Report icons created by Vasil Enchev, Arthur Shlain, and TukTuk Design, respectively (from the Noun Project at nounproject.com).

"Natural Hazards, Vulnerability, and Risk" Course Overview

The objectives of the course are to (a) expand students' knowledge about the causes and consequences of natural hazard events, (b) explain risk and identify local areas at high risk to natural hazard events (place-based learning), (c) learn how to integrate geoscience and social science methodologies to understand the societal impacts of natural hazards, (d) understand the phases through which people typically pass in the process of taking prehazard preparedness actions and apply this knowledge to analyze barriers to preparing across the students' community, and (e) improve communication skills while making a difference in the community by developing and delivering innovative ways that promote household preparedness, and thus community resilience, to future natural hazard events.

The course consists of four active learning-based units. The first three units, which include developing a knowledge of hazards, risk, social science methodologies, and the psychology behind decision-making (Model Steps 1–3; Figure 1), are completed over the first 6 weeks of class. Students begin by interactively engaging in place-based exploration of natural hazards, social vulnerability, and risk. They identify local hazards and create a risk map based on where natural hazard zones overlap with vulnerable systems. Students then conduct and analyze a web-based survey with local residents to assess the level of knowledge, accuracy of risk perception, and level of preparedness.

The fourth unit, which takes 10 weeks and involves the service-learning component, includes learning about communication strategies, assessing existing resources, and developing new resources for communicating hazard, risk, and preparedness information with the public (Model Steps 4–6; Figure 1). Students collaborate with community partners (the Boise State University campus emergency manager and the Ada County Emergency Management community outreach specialist) to develop outreach materials, based in active learning principles, which address barriers to preparedness (Model Steps 7–8; Figure 1). Students contribute to their community by implementing their outreach tools with their chosen audience and testing the efficacy of their tools on natural hazard awareness and preparedness motivation (Model Steps 9–10; Figure 1).

The significance of incorporating service-learning in this class is multilayered. First, students develop a deeper understanding of the class material through application. This helps them acknowledge how the class and the information they are learning has a direct impact on themselves, their family, and their community. Service-learning allows students to reflect on why educating the community about natural hazards is vital to people's lives and environmental sustainability. Finally, the service-learning opportunity helps students relate the materials to their lives and empowers them with the knowledge that they can make a difference in their community (see the Student Reflection Results section).

Reflection is a key element in both active learning and service-learning. According to Hatcher, Bringle, and Muthiah (2004),

> When reflection activities engage the learner in examining and analyzing the relationship between relevant, meaningful service and the interpretative template of a discipline, there is enormous potential for learning to broaden and deepen along academic, social, moral, personal, and civic dimensions. (p. 39)

Moments for reflection allow students to pause and be mindful of their service-learning project, their learning, and the outcome. There are different forms of reflection, including providing structured questions, freeform journaling, and group discussions. In this course, students engage in reflection through short answer question assignments, complemented by class reflection discussions.

Community partners. Service-learning projects are for the benefit of the community as well as the students. As such, a key precept of service-learning is to involve community partners in the planning, implementation, and evaluation of the course project (e.g., Jacoby, 2003). Interaction with a community partner is critical to the success of such a class, as students' work products need to be an asset for them as well. The course described here benefited from two community partners: the Boise State University campus emergency manager and the Ada County Emergency Management community outreach specialist. The course instructor approached both partners when developing the course, several months before the start of the semester. The

instructor and partners discussed the course objectives and partner expectations. Both partners participated without hesitation and expressed excitement and interest in the opportunity.

The role of the Boise State University emergency manager and the Ada County community outreach specialist is to visit the classroom during the first 5 weeks to discuss the relevance of students' efforts. They also attend student presentations, provide guidance and input for development of outreach materials, provide support and insight for outreach activities, and facilitate outreach events for students. In return, the students provide all results, final outreach materials, and final reports to the partners at the end of the semester. Both partners reported their experience in a satisfaction questionnaire at the end of the semester (see "Evaluation With Community Partner" section).

Course Details Mapped to Community Outreach Model of Service-Learning

Here we provide a brief description of each of the Map Your Hazards education module units (Units 1–3). For a detailed description for implementing the Map Your Hazards education module units, see Brand, McMullin-Messier, and Schlegel (2014) and Brand, Schlegel, and McMullin-Messier (2019).

In Unit 1, students work in groups to identify and apply credible geologic and social science data sets to identify local hazards and vulnerable groups and structures within a given map area of their city (Figure 2). Based on the overlap between hazard zones and vulnerable systems (Figure 3), students designate risk zones for the map area (low, medium, high, and severe risk; Figure 4). Risk assessments must be justified by citing credible sources and adequately explaining the different risk zones designations. This unit maps to Steps 1 and 2 of our model for community outreach-based service-learning (Figure 1).

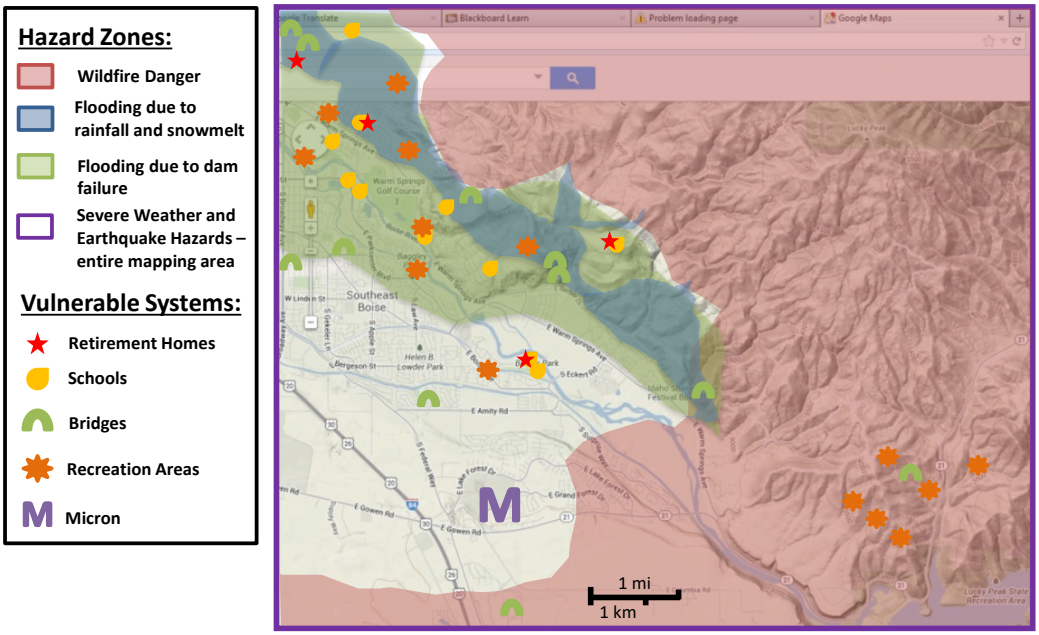

Figure 2: Combined hazard and vulnerability map: an example mapping exercise for a region a few miles east of downtown Boise, Idaho. Hazard regions designated based on the Ada County Hazard Vulnerability Analysis 2010 (Ada County, 2010).

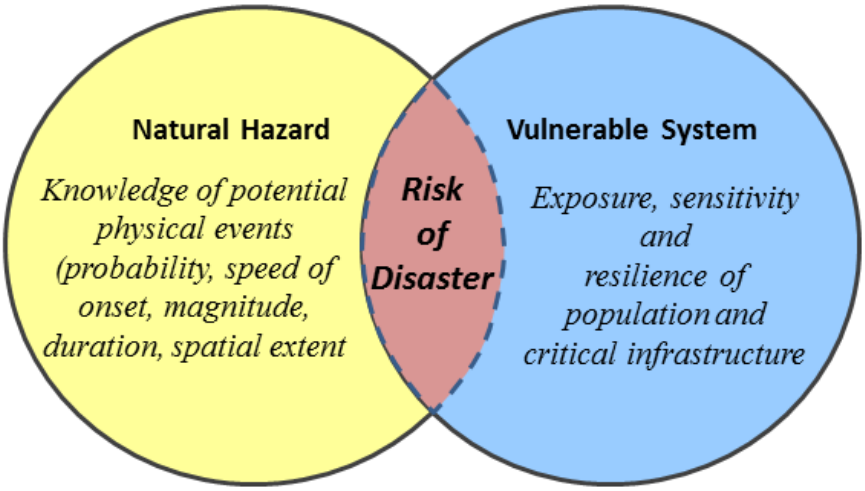

Figure 3: Diagram illustrating risk of disaster (modified from Wood, 2011, and Brand et al., 2014).

During Unit 1, the community partner, in our case, the Ada County Emergency Management outreach specialist and Boise State University emergency manager visit the class to talk about the role of emergency management in hazard and risk communication and mitigation. The emergency management specialists also answer questions the students may have regarding their exploration of local hazards and risk, guiding them to better risk designations for their mapping areas.

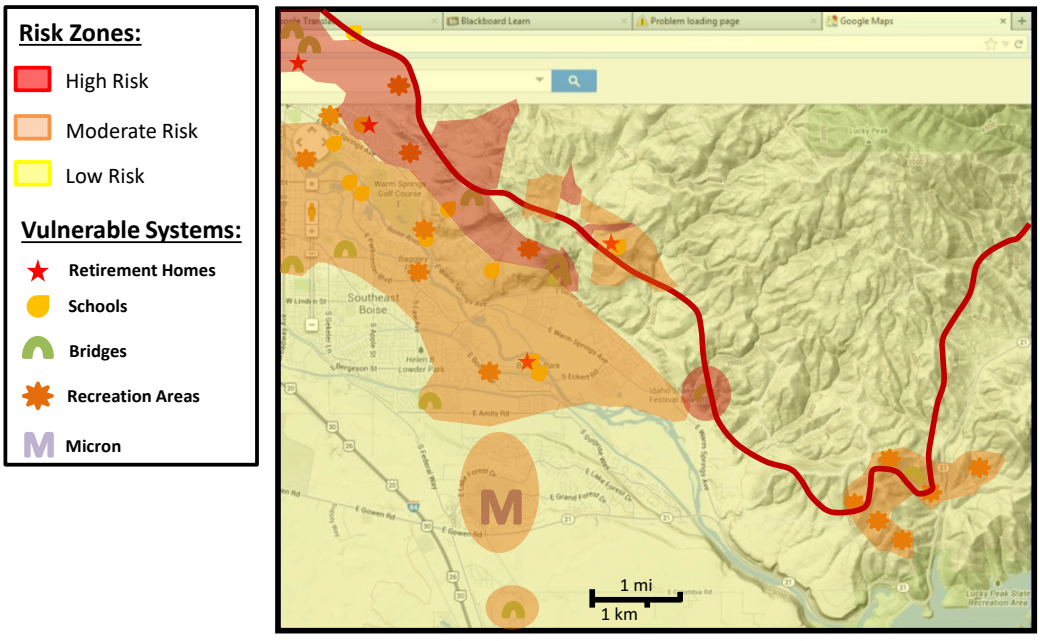

Figure 4: This map is meant to illustrate the regions at greatest risk based on the overlap of hazard zones and vulnerable systems. Students designate high-, moderate-, and low- (if applicable) risk zones, and they are required to defend their choices as part of the assignment.

In Unit 2, students explore the current level of community awareness and strategies to increase it. Specifically, they investigate the state of knowledge, accuracy of risk perception, and level of preparedness for hazards in their community. This unit begins with an introduction to the factors that shape perception and a detailed explanation of the protective action decision model (PADM; Lindell & Perry, 2012). The PADM integrates approaches in social influence, persuasion, behavioral decision-making, attitude–behavior relationships, and innovation to identify the phases through which people typically pass in the process of taking protective action (e.g., Lindell & Perry, 2012). The most important take away from the model is that, for people to decide to take preparedness actions, they must receive and trust the message and the message source, be able to personalize their risk, and develop positive attitudes to the efficacy of recommended preparedness actions.

Students then distribute a web-based natural hazard and risk questionnaire that assesses knowledge, trust in message channels, accuracy of risk perception, attitudes toward preparedness, and level of hazard preparedness for Boise metropolitan region residents. Students and the instructor distribute the questionnaire to Boise residents through their social networks, Facebook, Nextdoor, and university networks. For the Spring 2017 course, we received 327 completed questionnaires. Students analyze the questionnaire data and demonstrate their understanding of the PADM by applying the framework to interpret questionnaire results. Students specifically identify which aspects of PADM may be weakest in the surveyed population. Unit 2 maps to Step 3 of our model for community outreach-based service-learning (Figure 1). Findings from this unit serve as the basis for which they will develop targeted outreach materials in Unit 4.

In Unit 3, student groups finish a written report detailing the results of Units 1 and 2. They also develop a 7-min-long oral presentation to present their risk maps and questionnaire findings to our community partners. Based on their findings, students make recommendations for improving preparedness, resource allocation, and city planning to help build a more resilient community (both in the report and oral presentation). This unit maps to Step 4 of our model for community outreach-based service-learning (Figure 1). The presentations, which serve as an important assessment tool for Units 1–3, also help prepare students for their final presentation in Step 10 of our model (Figure 1).

Unit 4 begins with a short-answer reflection questionnaire and subsequent class discussion. The goal of the reflection and discussion is to assess the students' knowledge, engagement, and attitudes toward the course content before moving into the community outreach, service-learning component of the course. This reflection also allows the authors to assess the role of active learning alone on knowledge and student engagement.

Next, to gather ideas for their outreach activity, the students review as many existing outreach resources that they can find for their community. Each outreach resource is evaluated on target audience, presentation design, clarity of content, and language. Students also evaluate outreach resources on their ability to help readers personalize their risk, and the ability to help readers develop positive attitudes toward the efficacy of preparing. This activity maps to Step 5 of our model for community outreach-based service-learning (Figure 1).

Based on their assessment of existing materials and the results of the community questionnaire from Unit 2, students begin thinking of creative approaches to communicate hazard and risk to the public in a way that motivates preparedness actions. Students must first choose a specific audience to target. For example, they may choose international college students, first-year college students, residents living in flood zones, Boise residents who can be reached via social media, or any other group they come up with. They then begin developing their community

outreach materials, which are required to (a) be based in active learning and/or storytelling, (b) help their audience personalize their risk, (c) help their audience develop positive attitudes toward the efficacy of preparing for future hazard events, and (d) target a weakness identified from the Unit 2 questionnaire results.

Students regroup into teams based on their skills and interests in the types of community outreach activities (individual projects were also permitted). The new student teams continue developing their outreach materials, assessments, and implementation plan over the next few weeks and present their progress to the class weekly to receive feedback and advice from their peers and the instructor. Most importantly, the students work closely with the emergency management partners to ensure all materials are accurate and aligned with the messaging of local emergency managers. These activities map to Steps 6 through 8 of our model for community outreach-based service learning.

Next, students pilot the outreach materials with their intended audience (Table 1). For example, those who focused on international students sent the pretest, education video, and post-test to the international student office, who then distributed the materials by e-mail to Boise State University international students. The group who created the *Jeopardy* game recruited from their dorm for the English version; participants for the Spanish version were recruited through the Boise State world languages department and the local Boise salsa dancing community. One group recruited and ran the activity through their church, whereas other groups ran their social media quiz across social media platforms in Boise. Each of these audiences was first given a pretest that assessed local hazard knowledge, risk perception, preparedness actions previously taken, and intent to take additional preparedness actions. Post-tests asked a similar set of questions to assess if the education activity improved knowledge and motivated an intent to prepare. These activities map to Step 9 of our model for community outreach-based service-learning (Figure 1), and each target audience reached is listed in Table 1.

Finally, to complete Step 10 of our model (Figure 1), the students report a description of their materials and the results of the pre- and post-test in a final oral presentation and a written report. Both the report and final presentation require a reflection and statement for what could be done differently or more effectively in the future.

Results: Course and Community Outreach Outcomes

Eight students completed the course. Two of the students chose to complete final outreach projects independently, whereas the other six worked in pairs. The projects included story-based, online information videos (Projects 1 and 2); interactive, in-person games or video projects (Projects 3–5); a social media quiz (Project 6); and an interactive online module (Project 7). Each group targeted and tailored their materials to a specific audience. The projects, audiences, and descriptions are presented in Table 1.

Table 1: *Project Descriptions*

Project	Audience	Media	Goal	Assessment Style	Results
1	International Students at Boise State University	Video	Sign up for Bronco Alert[a]; understand winter weather hazards, how to prepare for hazards, and where to get supplies	Pre- and post-test, questionnaire style	Overall increase interest in buying extra food for dorm room (82% will get extra food for dorm; 12% are unsure)
2	Boise State students (general)	Video	Sign up for Bronco Alert; understand severe weather hazards, how to prepare for hazards, and where to get supplies	Pre- and post-test, questionnaire style	Increase in (a) knowing what a Bronco alert is and (b) signing up for Bronco alert; 50% responded yes to creating an emergency kit, and 25% responded that maybe they would create an emergency kit (only 15% reported having emergency kits before the video)
3	Local church group	Interactive video where audience is given options, with the consequences of their choice revealed in a subsequent video	Understand local hazards; develop a family emergency plan; start a basic emergency kit for home and car	Pre- and post-test, short answer style	Increased confidence in personal ability to prevent property damage by severe storms; only 4 of 20 participants had emergency plan before the video activity, but all participants had a family plan after (developed plans during exercise); increased interest in starting an emergency kit
4 and 5	Boise State students living in campus housing	*Jeopardy* game (English version)	Understand local hazards; make a family plan; start a basic emergency kit for home and car	Pre- and post-test, questionnaire style	(Two populations with same results, so they are combined here) Half of the participants reported an awareness of earthquakes in Boise before the game; all participants reported awareness of the potential for Earthquakes in Boise after the game; half reported no intention to make an emergency plan before the game;

	Spanish-speaking population	*Jeopardy* game (all materials presented and written in Spanish)	Understand local hazards; make a family plan; start a basic emergency kit for home and car	Pre- and post-test, questionnaire style	all reported intention to make a plan after the game; more than half did not intend to secure furniture to the walls before the game; all reported an intention to secure furniture to the walls after the game.
6	Boise general population	Social media quiz with cartoons and anecdotes; short video showing how to create a “to-go” emergency kit	Understand severe weather hazards; start a basic emergency kit for home and car	Questionnaire throughout social media quiz, with identical pre- and post-test questions	Percent of people who reported having an emergency kit decreased from pre- to post-test, interpreted as not knowing everything that should be in an emergency kit; Significant increase in intention to prepare from pre- to post-test

[a] Bronco Alert is the Boise State Emergency Alert System.

Pre- and post-tests for Groups 1–6 showed overall increases in community awareness of natural hazard knowledge and preparedness intention (Table 1). The only module that did not have positive post-test results was the online, interactive flood module, which required advanced technology, more than 10 minutes for completion, and long video explanations. We interpret that the lack of completion suggests the materials were too involved and presented at a level above that of the intended audience.

The concluding assignment was to complete the final report, which details all aspects of their course project (Units 1–4), pre- and post-test outreach material results, and ideas for improving community outreach materials. Upon completion, the instructor provided all final reports and all outreach materials to our emergency management partners. The students also gave a final presentation on their Unit 4 materials, assessments, and ideas for improving outreach materials during the final class period.

Course Assessment and Effectiveness

The instructor used a variety of strategies to assess the effectiveness of the active learning and community outreach service-learning project in increasing student comprehension, engagement, and attitudes. Course concepts as a whole are assessed through precourse and identical postcourse questionnaires, which determine natural hazard knowledge, experience, risk perception, attitudes toward preparedness, and current level of preparedness. Rubrics for each assignment ensure that the students understand and meet the requirements of each unit. Students present their work throughout the term, receiving feedback from the instructor, community partners, and their peers. Mid-course and end-of-course reflection questions assess what students learned about themselves, the skills and knowledge they acquired through the experience, and any changes to their values, opinions, or beliefs. Students also work on a report throughout completion of each unit, which serves as an end-of-unit assessment and (ultimately) a final product resource for our community partner.

The objective of the service-learning project was for students to learn from the interactive experience academically, civically, professionally, and personally. Academically, students' Unit 3 presentation and reports demonstrated that they learned to integrate interdisciplinary geoscience and social science methods to evaluate societal impacts that result from natural hazards. The report, presentations, reflection answers, and pre- and postcourse questionnaire responses demonstrate that students developed an understanding of local threats and developed positive attitudes toward preparedness actions that reduce the risk of threats. Student assessments also demonstrate that students either took preparedness action or reported a motivation to do so. Unit assignment results show that students also learned the PADM, factors that shape perception, and factors that shape risk tolerance, then applied this knowledge to analyze questionnaire data and develop outreach projects. Lastly, the final project demonstrates that students developed communication skills that persuaded citizens to prepare for future threats.

Students' community outreach projects, final presentations and reports, and reflection answers demonstrate that, civically, students gained insight into how people's knowledge and perspectives of the world shape how they interact with it. They developed interest in learning more about their community's risk from natural hazards and vulnerabilities and were empowered to make a positive impact on their communities through effectively communicating preparedness recommendations**.** Their community outreach projects represent solutions for communicating how informed citizens and professionals promote and

build resilient communities through understanding the relationship between human systems (built environment) and natural systems.

Professionally, students were able to communicate findings and recommendations to community partners through written reports and an oral presentation. They learned to work together, both in groups and with our community partners (Boise State University campus emergency manager and the Ada County Emergency Management community outreach specialist), to produce outreach materials that ultimately benefited their community.

Student Reflection Results

The mid-course reflection occurred after completion of Unit 3. The students first completed questions, then discussed and furthered their answers to the questions in a subsequent class discussion. The final reflection discussion was the last day of class, followed by a final reflection short answer questionnaire.

Reflections mid-course demonstrated that students had a strong grasp of local threats and the recommended preparedness actions. However, their answers to questions regarding their interest in preparing or helping their community prepare for future natural hazard events were mixed. This suggests that active learning, at this stage in the course, was successful in increasing student content knowledge and, to some extent, motivating preparedness actions but did not fully inspire or empower the students to make a difference with their acquired knowledge.

In contrast, the final reflection discussion and written answers to questions were inspiringly positive. It appears the major shift in attitudes and self-efficacy occurred during the development and implementation of their community outreach project. We interpret that, through the service-learning activity, students realized they could make a difference and, upon seeing the success of their outreach materials in the community and with our local community partners, realized their responsibility and interest in sharing their knowledge. See Table 2 for a selection of the students' final reflection answers.

Personally, students reflected about how they can make a difference in their community and what personal impact they have on other people. According to their final written reflections, students realized how helping others and being part of a community brings value to their lives and encourages them to be active citizens and lifelong learners.

Table 2: *Selected Answers to Final Reflection Questions*

Question	Selected Answers
1. Describe what you have learned about yourself as a result of your service.	…I have the ability to educate others in nature hazards now, and if I can teach at least one person something, they have the ability to do the same. It's a chain reaction, so just start somewhere small.
	… I need to communicate better when collaborating with others.
	… in order to be a responsible community member it is my job to help inform others how to better prepare for an emergency situation.
	I feel a responsibility to help where I can and use my strengths to reach other populations.
2. What skills and knowledge did you acquire through this experience? How will you use what you learned in other situations?	… how to keep people engaged through interactive tools as one's attention span isn't very long.
	I gained public speaking skills and I learned how to communicate with academics on campus.
	…how to make connections. I will use these skills to further network myself as well as give better presentations. I am much better at community outreach and this skill will be valuable in social psychology where I must make contacts with people for research purposes.
	I gained knowledge about my community through their positive responses. I helped improve my oral communication skills, which will undoubtedly be used in other situations. My writing skills, in regards to reports and video scripts, strengthened as well.
	…the different types of communication styles that can be directed at different groups of people to help them learn about natural hazards. An example of this would be active communication.
3. What values, opinions, beliefs have changed? What was the most important lesson learned?	The most important thing I learned was that one person can make a big difference in this world. Whether it's on the topic of natural hazards or something else.
	I also never realized how many people are not reached by the limited communication types involved in emergency management. I learned the overall value of differing communication outlets to reach a variety of audiences.
	I feel responsible to help share this information not only with the people around me, but also with people who have never had the opportunity to hear the message. Making the information available in simpler terms and other languages is a responsibility that could have grave consequences if not accounted for.
4. Complete this sentence: Because of my service-learning, I am....	… well equipped for a future natural hazard in the Boise area and am more aware of job openings in this field.
	…a greater advocate for preparedness to my friends and family.
	… more aware of my community and better at communicating with those a part of it.

	…more ambitious in serving my community. … more knowledgeable and prepared for natural hazards to such an extent that I can impact my community. …excited to pursue the opportunity to make a difference in my community, and hopefully beyond.
5. Give an example of how “Be the change” changed you. Comment on at least two character traits you have further developed during this experience.	Creativity and open mindedness are two character traits that I have further developed during this experience. I would say that this experience has made me more empathetic. I would also say that it has made me more thoughtful about how to communicate scientific information or safety knowledge in general to the public. My proactive nature has improved as well as my desire to advocate. I now personally believe it is my responsibility as an informed citizen to share that information. Another character trait I gained was the ability to collaborate with many different group members to create an effective deliverable. Throughout the process of developing and implementing my final project, I have worked on my leadership and am more proactive. To me "Be the change" is all about passing on the knowledge I have learned through this course to help others in my community any way I can. I am now more actively aware that different groups of people communicate in different ways so knowing your audience is important if you are trying to get your message out. I am not a very outgoing person but this course has made me want to be more involved with my community. I also think this course helped contribute to the responsibility I feel towards helping others.

Evaluation With Community Partner

The Ada County community partner was an active participant throughout the semester. She gave a lecture on the roles and responsibilities of emergency management in the community and discussed the importance of raising awareness and promoting preparedness for local natural hazards. She also served as a soundboard and observer of the students' work and helped them develop community outreach materials with a unified message. Through a postcourse partner survey, the Ada County partner reported that working with the students and professor made her feel valued by the university as an expert and as a representative of her organization. She reported being highly satisfied with the experience and with the relationships she developed with the faculty and students. She also expressed a clear interest in future collaborative projects.

The Boise State University campus emergency manager, who sat in on the students' presentations and provided feedback on their community outreach materials, also reported a high level of satisfaction with his involvement in the course. He stated that he looks forward to future collaborative projects.

Instructor Reflection on Implications and Service-Learning Effectiveness

The most rewarding moments in teaching are when students not only grasp the course concepts but also become enthusiastic about the materials. Coming into the course, most students openly admitted to taking the course because "they needed the credit hours" or "it fit their schedule," demonstrating at least some degree of apathy for the course content. Early in the course, two students openly mocked people they knew who were prepared for natural hazard threats and other emergencies and clearly had not intended to take preparedness actions themselves. Of the eight students, only one expressed interest in the course materials based on personal experiences.

The integration of the service-learning community outreach component clearly made a difference. Based on assessment scores and early versions of what would be the students' final report, students had clearly gained a firm grasp of the course materials by the end of Unit 3. However, although the students' mid-course reflection questions demonstrated increased knowledge and interest in the subject, they did not demonstrate significant enthusiasm or excitement about their ability to make a difference in their community (measured through the mid-course reflection answers and discussion).

The change started early in Unit 4, when students began critiquing the education materials available to the general public. They found some examples they liked, but of the examples they found, most were overly wordy, too busy, contained too much text, and were not targeted to specific segments of the population; in addition, many students were concerned that outreach materials were largely only available in English. This review prompted a discussion about best-practice education strategies, and how the existing materials and approaches to natural hazard preparedness outreach might be improved to include these strategies. We also discussed who makes up a "general audience" and how different types of audiences might benefit from different education approaches.

After evaluating existing materials, the students began identifying a target audience, an effective message, and channels to deliver the message (Table 1). During each class period during the development and implementation period, students presented their progress, each time reminding their classmates of (a) their audience, (b) their target hazard or message, (c) how the materials help the intended audience personalize their risk, and (d) how the materials help the intended audience develop positive attitudes toward preparing for future natural hazard events.

They received weekly feedback from the instructor, emergency management partners, and their peers for improving their community outreach materials and assessment strategies, allowing the entire class to play a role in all outreach activities.

The transformation occurred during the development and implementation of the students' community outreach projects. Based on the instructor's observations and students' answers to final reflection questions (Table 2), students started taking ownership of their new knowledge in a way that empowered them to make a difference. Toward the end of the semester, the students became inspiring community role models. By the end of the term, most students had created their own emergency plans and kits, and reported initiating discussions regarding natural hazards and preparedness with their friends and family (assessed through postcourse questionnaire and final reflection questions).

To further demonstrate student engagement, six students went beyond the requirements of the course and volunteered to present their outreach materials and findings at the Oregon Prepared Emergency Preparedness Workshop (Sunriver, OR; April 2017). The students gave a well-developed, knowledgeable, 1-hr presentation to a room of around 100 Oregon-based emergency management stakeholders. Their presentation received overwhelmingly positive feedback from the audience, and unanimous requests for the students' materials. The students provided all materials to the workshop participants through Google drive. Several emergency managers have since informed the course instructor that the materials are being adopted and applied in Oregon communities.

Transferability to Other Courses

Service-learning is an effective form of active learning that benefits the community and could strengthen many courses. (Levesque-Bristol et al., 2011; Molee et al., 2011; Zlotkowski, 1996). Though service-learning was implemented into a geoscience course in this study, service-learning pedagogy is transferable to most courses that focus on impactful relationships with a community partners (e.g., Knapp et al., 2010; Soska, Sullivan-Cosetti, & Pasupuleti, 2010). As in this study, students worked with community and university partners to create a course that engaged the student with "real-life" projects. Though the process takes preparation, thought, and dedication, this form of active learning is transferable and capable of helping students meet learning goals of many college courses. This deeper sense of learning can generate new knowledge that is not only transferable into employment, but also in their active citizen lives (e.g., Knapp et al., 2010).

Our community outreach model of service-learning (Figure 1) is applicable to a variety of disciplines. In courses where academic topics relate directly to community concerns (e.g. Environmental Science, Sociology, Political Science), students could help raise awareness through a community outreach project. In courses where communicating with the public is a specific learning outcome, students could collaborate with a community organization to reach target groups. Therefore, the service-learning approach developed in our "Natural Hazards, Vulnerability, and Risk" course is transferable by integrating the steps outlined in the methods and Figure 1.

Conclusion

Our "Natural Hazards, Vulnerability, and Risk" course effectively integrated active learning strategies to build content knowledge, and the service-learning strategies increased student engagement and self-efficacy. In addition to helping students learn geoscience and social science concepts, the class structure, and the service-learning community outreach project involved

students in a consistent and evidence driven way to promote a cultural shift toward community preparedness and resilience to natural hazards. As a result, students engaged deeply with the course materials and became community advocates for preparing the community for natural hazards. As such, the authors confidently answer "yes" to each of the questions posed in the introduction.

Based on the knowledge acquired in the first 5 weeks of class (Units 1–2) and evaluation of existing community outreach materials, students developed new, innovative community outreach materials based in active learning and/or storytelling best-practices. The goal of these materials was to educate the target community audience(s) on possible natural hazards. More importantly, the materials were designed to help the target audience(s) personalize their risk, develop positive attitudes toward taking preparedness actions, and ideally motivate a decision to prepare. Each community outreach activity included a pre- and post-assessment to evaluate efficacy of the outreach activity, which allowed students to quantify and appreciate their ability to make a positive community impact.

Finally, working with local emergency managers and presenting at the emergency management workshop were important professional development opportunities for the students. The students' participation demonstrated to the emergency managers how students can be an invaluable resource for sharing natural hazard information in their communities, and perhaps more importantly, demonstrated to the students how they can make a significant, positive impact on their local community and beyond.

In summary, the service-learning component, along with the consistent use of active learning strategies, helped students move from apathy to engagement on multiple levels: academic comprehension, skill development, and self-efficacy as community advocates. Units 1 through 3 gave students the knowledge, but the community outreach aspect of Unit 4 transformed them into community advocates, convinced of their ability to make a difference. We encourage all educators to consider how service-learning community outreach may play a role in their existing curriculum, as the steps presented in this case study are generalizable to other courses that focus on community-relevant issues. Service-learning can make a critical and possible life-impacting difference on the students' education, learning, and, possibly, their lives.

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