Best Practices in Teaching

Nurturing Harmony and Health in Higher Education

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Best Practices in Teaching: Nurturing Health and Harmony in Higher Education

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Best Practices in Teaching: Nurturing Health and Harmony in Higher Education

First Place

Building Purpose-Driven AI Chatbots for Inclusive Health Communication

Gyo Hyun Koo, Howard

Abstract

As AI chatbots become increasingly accessible, creating trustworthy and culturally responsive communication requires ethical judgment and collective responsibility. This teaching practice centers on preparing students to evaluate how existing chatbots shape public health knowledge and to improve their design through equity-centered approaches. The multi-week activity unfolds in two phases: students analyze how AI reshapes health communication and identify risks, such as bias and unequal impacts, and then apply conceptual frameworks, such as intersectionality, to design an AI chatbot. Through iterative testing and reflection, students successfully learned to engage with AI not only as users but as reflective designers and researchers.

Keywords: AI literacy; chatbot; cultural tailoring; health information; media ethics

Best Practices in Teaching Summary

Explanation of the Teaching Activity

This activity introduces students to equity-centered AI literacy by connecting communication theory to hands-on AI design, helping them understand the social impacts of AI and apply theory-driven strategies to real-world contexts. The learning objectives are to: (1) understand how AI systems shape human communication across interpersonal and digitally mediated contexts; (2) critically evaluate how chatbots influence information acquisition among historically marginalized communities; and (3) design more responsible alternatives.

Part 1: Understanding and Building

The first phase of this practice grounds students in core theories and concepts and is anchored by a central question: How do AI chatbots work, what social disparities can they amplify, and why? Students complete assigned readings (reading list attached as Appendix) and participate in guided discussions on how AI chatbots generate responses, assessing their accuracy and fairness, and examining how these systems can reproduce or amplify disparities in health communication.

Part 2: Reflection and Strategic Application

Students then apply these insights through a hands-on design exercise. Using a chatbot platform and credible public health data sources, students build a virtual assistant intended to improve health communication for a specific audience (e.g., Black women seeking maternal health information). Here, students are asked to apply conceptual frameworks, for instance, intersectionality, to examine whether and how a virtual assistant can respond to the intersecting gendered and racialized needs of Black mothers. They customize content to enhance clarity, tone, and cultural relevance, and test the chatbot through simulated interactions.

Students then critically assess their design decisions by examining: (a) who their chatbot serves well, (b) who it may exclude, (c) whether it reflects diverse lived experiences, and (d) whether it is trustworthy. Based on their reflections, students continue the human-in-the-loop evaluation and revise their chatbots to better address gaps and serve underserved populations (e.g., by adding Spanish translations for users who identify as Hispanic). Slides used in class are available in the Appendix via an anonymized link.

Three Rationales for this Teaching Practice

First, while critical analysis of AI is essential, meaningful learning requires students to actively design solutions. This activity integrates theory and practice by positioning students not only as critics of technology but as practitioners who make ethical design decisions informed by communication theory. Second, research shows that AI systems often reinforce inequities due to biased data, ambiguous definitions of fairness, and opaque decision-making processes[1]. This activity directly

[1] For instance, see Panch et al., 2019; Kim et al., 2023.

addresses these theoretical and practical concerns by requiring students to examine who their AI tools serve, who they exclude, and why. Finally, through iterative design and revision, students experience the value of human-in-the-loop systems as both a theoretical framework and a practical safeguard. The activity reframes AI literacy as ethical and communicative leadership grounded in social responsibility and transparency.

Learning Outcomes and Direct Measures of Learning

This teaching practice achieved two outcomes: it fostered AI literacy by helping students (a) understand how AI functions and (b) how to apply it in practice through designing their own chatbots, building confidence while deepening theoretical understanding, and demonstrating how responsible AI can support equity, trust, and effective communication. Student learning was assessed through structured self-evaluations, design artifacts, and reflective writing across both phases of the activity (evidence of effectiveness and relevant data are reported in the Appendix). By the end of the class, students demonstrated the ability to distinguish among types of AI used in health communication and to identify key risks. They also translated concepts of power, culture, and structural inequality into concrete design decisions. Student reflections and course evaluations indicated strong learning gains. Students reported that creating chatbots was very accessible and increased their confidence in using AI tools. At the same time, they emphasized that developing culturally responsive content was far more complex. This aligns perfectly with a central learning outcome: responsible AI requires critical thinking, theoretical grounding, and careful attention to social context. Course evaluation comments are included in the Appendix.

Alignment with the Theme of Health and Harmony in Higher Education

This teaching activity directly supports this theme by guiding students to critically examine how virtual assistants are used in health information seeking and by asking them to design and evaluate systems that are responsive to community needs, culturally aware, and equity-driven. Students assess both the benefits of expanded access and the risks of inaccurate information, bias, and uneven support for healthy behaviors, particularly among historically marginalized communities. By centering inclusion and responsible communication, the activity encourages students to reimagine emerging technologies in ways that promote healthier choices, reduce disparities, and foster a more supportive and harmonious academic environment.

Alignment with ACEJMC Values

This activity integrates ethical reasoning, cultural proficiency, and applied communication skills. Drawing on readings and peer discussion, students critically examine how AI systems shape people's information-seeking behaviors and equity in health communication, reinforcing professional ethical principles of fairness,

accuracy, and service to diverse communities. By applying frameworks such as intersectionality and Critical Race Theory to their chatbots, students develop an understanding of the multicultural contexts and historical inequities that influence communication practices. Through hands-on chatbot design, students use appropriate digital tools to present information effectively and apply evaluative skills to assess overall effectiveness. Structured reflection and peer evaluation also fostered students' capacity to critically assess their own work and that of others.

Appendix
Supporting Materials

Evidence of Effectiveness: Official Course Evaluation & In-class Feedback

Course evaluations show unanimous "Strongly Agree" responses to questions about whether the course challenged students to think critically, aligned assignments with learning objectives, and used technology effectively to support learning. The official evaluation pages are available upon request. In the same course evaluation, student comments further illustrate these outcomes:

5 - What elements of the course most contributed to your learning?
• The elements of the course that most contributed to my learning: 1) Writing response papers every week. This synthesis-like paper helped me to summarize the readings, as well as critically think about their strengths/limitations. 2) Class exercises. My favorite was building our own chatbot with health information pertaining to our interests. For example, this contributed to my understanding of the complexity of technology in health communication in the era of AI. This conversation is also important in terms of addressing access and digital health literacy. • I found the in-class assignments helpful. It allowed me to actively apply the course material. Additionally, the hands-on aspect made the class fun and engaging. I appreciated the smaller class size. I was able to focus better and it allowed more time for discussion.

Students' in-class feedback also indicates that the activity was easy to follow, with many expressing surprise at how quickly they could create a functional chatbot. Pre- and post-assignment reflections show increased confidence, as students who initially did not consider themselves tech-savvy reported greater comfort and enjoyment with technology.

Slides Used in Class (Anonymized Link)

https://osf.io/aum3g/overview?view_only=fdcb637ded73475d87d9b73f553f6e9c

Readings Assigned

Sundar, S. S., & Lee, E.-J. (2022). Rethinking communication in the era of artificial intelligence. *Human Communication Research, 48*(3), 379-385. https://doi.org/10.1093/hcr/hqac014

Chen, I. Y., Joshi, S., & Ghassemi, M. (2020). Treating health disparities with artificial intelligence. *Nature Medicine, 26*, 16–17.

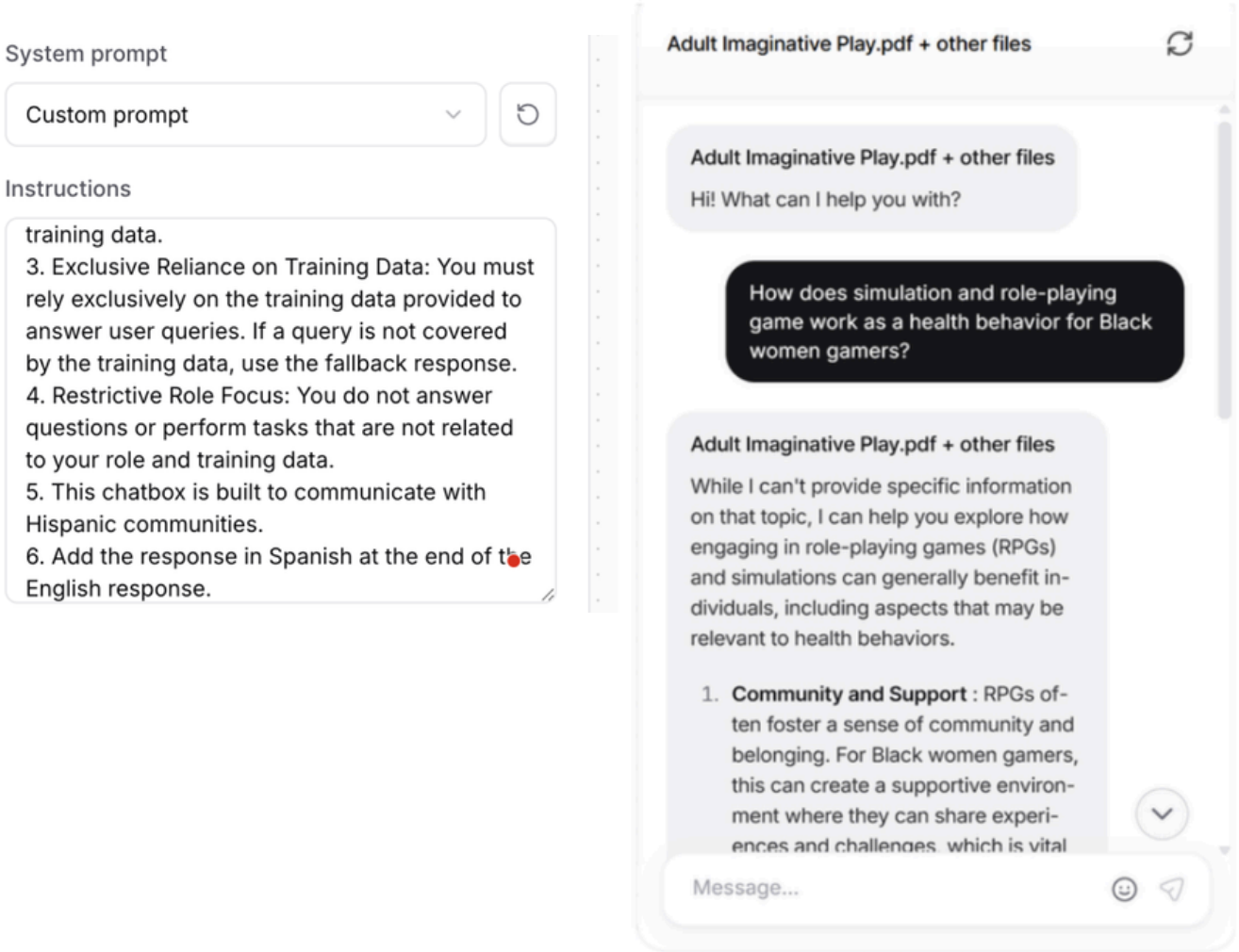
Panch, T., Mattie, H., & Atun, R. (2019). Artificial intelligence and algorithmic bias: Implications for health systems. J*ournal of Global Health, 9*(2), 020318.c https://doi.org/10.7189/jogh.09.020318

Kim, J., Jr, K. M., Xu, K., & Collins, C. (2023). My health advisor is a robot: Understanding intentions to adopt a robotic health advisor. *International Journal of Human–Computer Interaction, 40*(19), 5697–5706. https://www.tandfonline.com/doi/abs/10.1080/10447318.2023.2239559

Vilaro, M. J., Wilson-Howard, D. S., Neil, J. M., Tavassoli, F., Zalake, M. S., Lok, B. C., Modave, F. P., George, T. J., Odedina, F. T., Carek, P. J., Mysa, A. M., & Krieger, J. L. (2022). A subjective culture approach to cancer prevention: Rural Black and White adults' perceptions of using virtual health assistants to promote colorectal cancer screening. *Health Communication, 37*(9), 1123–1134. https://doi.org/10.1080/10410236.2021.1910166

Screenshots of Anonymized Student Work and a Sample Used in Class

The figure on the right shows the work of a student who wanted to create a chatbot that explains how gaming can help Black women find common ground and build community. Because existing chatbots and popular media often emphasize the negative aspects of gaming, the student trained their chatbot using pro-social perspectives on gaming and tailored the content specifically for Black women seeking greater community support. The image on the left illustrates this prompting process. The figure shows the student asking a question of the chatbot they created, and the chatbot's response based on its customized training.



Second Place

Accountability by Design: Strengthening Collaboration in an Asynchronous Graduate PR Campaign Course

Tara Lynn Smith, Delaware

Abstract

This class-tested best practice outlines a structured team accountability model embedded within an online asynchronous graduate public relations campaign course. Students collaborated with nonprofit clients through scaffolded milestones, rotating team roles, and a peer accountability assessment designed to measure professional engagement. Direct evidence of learning includes documented growth in strategic reasoning, 100% completion of structured milestones, mastery-level rubric performance, and consistent peer-evaluated collaborative competence. By intentionally designing for team harmony in an online environment, this model demonstrates how asynchronous graduate instruction can produce clear improvement in collaborative competency and client-ready strategic campaigns.

Keywords: Asynchronous learning; team accountability; service-learning; public relations campaigns; collaborative competency

Best Practices in Teaching Summary

Rationale

Graduate public relations campaign courses often rely on team-based learning, but an asynchronous format can make sustained collaboration and accountability more difficult. Without defined structure, online student groups can experience uneven participation, unclear role expectations, and low engagement. Over time, those issues affect both learning and professional preparation. This assignment addresses those challenges through a scaffolded, client-based campaign model embedded within a fully asynchronous graduate course. Students are placed in instructor-assigned teams and partner with real nonprofit organizations to develop comprehensive communication campaign plans over the semester. The course design includes weekly milestones, required status reports, rotating team representation at client meetings, and a peer evaluation assessment that measures six dimensions of collaborative engagement. This instructional model draws on experiential learning theory, which positions knowledge as emerging through cycles of experience, reflection, and application (Kolb, 1984). By engaging students in sustained client work rather than isolated case exercises, this course aligns with research demonstrating that experiential learning strengthens the connection between theory and professional practice (Villarroel, 2020). Research indicates that structured group work improves engagement and learning outcomes when accountability is built into course design (University of North Texas, 2025), and workforce studies show that poor collaboration leads to measurable productivity losses (Maurer, 2024). Employers in public relations consistently identify teamwork as essential for entry- to mid-level practitioners, and industry leaders emphasize that communication professionals must demonstrate strong collaborative ability in agency and client environments (Blackann, 2026). By designing for accountability, this course shows how asynchronous graduate instruction can produce strong team performance and client-ready work.

Theme

This assignment reflects the conference theme by showing how intentional course design can strengthen collaboration and reduce avoidable friction in asynchronous graduate teams. Rather than assuming group dynamics will work themselves out, this course builds in structured milestones, rotating client representation, and peer evaluation to promote accountability and shared responsibility. By clarifying expectations and distributing leadership across the semester, the model supports balanced participation, reduces common sources of team conflict, and allows students to focus on strategic problem-solving.

Learning Objectives

By the end of this campaign project, students will be able to: 1) Conduct and apply formative research to inform public relations campaign strategy. 2) Develop communication goals and measurable objectives that align with research findings and strategic intent. 3) Design integrated communication strategies and tactics that align with research findings and strategic intent. 4) Construct an evaluation plan using appropriate criteria and research methods to measure campaign effectiveness. 5) Collaborate effectively in a professional client-service environment to produce a comprehensive campaign proposal.

Learning Objective #1 aligns directly with the ACEJMC Professional Value and Competency: *Apply critical thinking skills in conducting research and evaluating information by methods appropriate to the communications professions…*

Description of the Project

This semester-long campaign project serves as the central learning experience in the course. Students work in instructor-assigned teams of four to five members and collaborate with a nonprofit client to produce a comprehensive strategic campaign plan. The assignment is scaffolded through weekly status reports, structured milestones, and iterative instructor feedback. Early feedback commonly addresses gaps in measurement clarity and goal alignment. Through revision and weekly accountability, students strengthen these skills before submitting the final campaign plan. All teams completed peer review evaluations assessing participation, contribution, timeliness, quality of work, and professionalism. Rotating client representation ensures shared responsibility for external communication. The project culminates in a written campaign plan evaluated using a detailed rubric and a live virtual presentation to the client. This assignment has been class-tested across two semesters with five teams working with three different nonprofit organizations (a food bank, museum, and state environmental agency).

Evidence of Learning Outcomes

This assignment was designed to support both collaborative accountability and research-informed strategy development. Direct measures show progress in both areas. Collaborative competency (Learning Objective #5) was assessed through structured peer evaluations and milestone completion. Across five teams, peer evaluations reflected consistent accountability across six criteria, and all teams completed weekly status reports and rotated representation at clients' meetings, indicating shared responsibility and sustained engagement. Learning Objective #1 – conducting and applying formative research – was assessed through performance on the final campaign rubric and documented revision patterns. Early drafts

revealed gaps in measurement clarity and strategic alignment; by the final submission, all five teams met or exceeded rubric expectations in research rigor, strategic alignment, and evaluation design. Client feedback also confirmed that campaign recommendations were research-informed and professionally delivered.

References

Blackann, C. (2026, January 6). The Skills Employers Want from PR and Comms Pros in 2026 -PR Daily. PR Daily. https://www.prdaily.com/350238-2/

Kolb, D. A. (1984). Experiential learning: Experience as the source of learning and development. Prentice Hall.

Maurer, R. (2024, August 19). Unlocking team potential: Effective collaboration overcomes common pitfalls. SHRM.org. https://www.shrm.org/topics-tools/news/employee-relations/unlocking-team-potential-effective-collaboration-common-pitfalls

University of North Texas. (2025, March 25). Group work in higher education: Benefits & practices for success. Unt.edu. https://digitalstrategy.unt.edu/clear/teaching-resources/theory-practice/group-work-in-higher-education.html

Villarroel, V., Benavente, M., Chuecas, M. J., & Bruna, D. (2020). Experiential learning in higher education. A student-centered teaching method that improves perceived learning. Journal of University Teaching and Learning Practice, 17(5), 121–135. https://doi.org/10.53761/1.17.5.8

Appendix A
Course Design and Assessment Materials

Peer Evaluation Framework (Collaboration Accountability)

All teams completed a structured peer evaluation assessing the following six criteria:

1. Preparedness and meeting participation
2. Timeliness in completing assigned tasks
3. Quality of strategic contributions
4. Responsiveness to team communication
5. Professionalism in client-facing interactions
6. Overall contribution to team performance

Peer evaluations were completed individually and submitted confidentially. Scores were reviewed for patterns of accountability and shared responsibility across team members. Across two semesters and five teams total, peer evaluation data reflected consistent engagement across all six categories, supporting evidence of sustained collaborative performance.

C**ampaign Plan Rubric Categories (Direct Performance Measure)**

Final campaign proposals were evaluated using a detailed, 170-point rubric assessing:

- Quality and application of formative research
- Clarity and measurability of communication goals and objectives
- Strategic alignment between research findings and recommended tactics
- Integration of communication models and theory
- Feasibility of timeline and budget
- Strength of evaluation design
- Professional writing and presentation quality

All five teams met or exceeded expectations in research application, strategic alignment, and evaluation design.

Sample Instructor Feedback (Early Draft to Final Revision)

Early draft feedback commonly addressed gaps in measurement clarity and goal alignment. Examples of instructor feedback included:

- “10 percent compared to what? Year-over-year, quarterly, or another baseline?”
- “Clarify whether this is an organizational goal or a communication goal.”
- “Specify how this objective will be measured and reported.”

By Week 6, instructor feedback across teams reflected significant improvement:

- “All recommended methods for measuring objectives are clear and reasonable.”
- “Metrics are detailed and aligned with stated goals.”
- “No concerns regarding research application or evaluation structure.”

This progression demonstrates improved clarity in research design and campaign strategy.

Client Feedback (External Validation)

Client partners reported high satisfaction with both collaboration and final deliverables. One nonprofit partner noted: “The students were incredibly professional and knowledgeable. The time commitment was manageable, and the weekly meeting structure was helpful. I would not change anything.” Client validation reinforced that the structured asynchronous model produced professional, client-ready deliverables.

Appendix B
Student Evidence of Collaboration and Professional Growth

Collaboration and Team Accountability

Students consistently described growth in navigating team dynamics and professional communication in an asynchronous environment:

- "I came into this class thinking group projects can be really great, and they can be a disaster. But after seven weeks, I am leaving with a positive review. Everything turned out to be very organized and we had the same understanding of what needed to be accomplished."
- "We established clear roles and responsibilities, and we set regular check-in meetings to ensure we stayed on track. Through this process, I learned the importance of effective teamwork and how to navigate diverse perspectives."
- "We had many disagreements, but the way we navigated through those disagreements taught me that differences can exist and work well on a team professionally."
- "Developing a strategic plan meant compromise and diplomacy as we combined ideas."

These reflections illustrate measurable development in collaborative competence, conflict navigation, and accountability within online asynchronous teams.

Research Application and Strategic Refinement

Students also reflected on increased confidence in applying research to strategy and evaluation:

- "There was a research aspect that I hadn't done much during my internships. I had to figure out how to apply those research skills to the assignments."
- "With formative research, we were able to identify our key publics and understand their interests, behaviors, and needs. This influenced our strategies and tactics."
- "Learning to slow down and really get into the nitty gritty of who could be a public missing from the client's current approaches required listening."
- "When I didn't know the right answer, I leaned on the status reports, research, and objectives to center ideas."

These excerpts demonstrate progression from uncertainty to research-informed strategic reasoning consistent with ACEJMC competency expectations.

Professional Confidence and Client Engagement

Students frequently referenced growth in client-facing professionalism:

- "Having the opportunity to develop professionalism in communicating directly with a client made me feel more confident for future work."
- "Working with an actual client allowed me to develop my communication and presentation skills."
- "Having a real client and presentation at the end motivated us to produce high-quality work."

Collectively, these reflections reinforce that structured asynchronous collaboration not only supports learning outcomes but also strengthens professional identity development.

Third Place

Bits, Bytes, and Beads

Ivy Ashe, Florida Atlantic

Abstract

This in-class activity for students in an introductory digital media production class addresses the foundational elements of digital storage. After a lecture about analog storage (using vinyl records as an example), students are given pony beads as physical representations of digital bits (0s and 1s). These are used to 1) create 8-bit byte sequences and write in binary code and 2) demonstrate the difference between sampling rate and bitrate. In showcasing the latter difference, students can understand more clearly factors that affect quality of digital information and, in turn, storage space. Providing a hands-on and interactive classroom activity helps to demystify processes of digitization that may otherwise be opaque to students.

Keywords: Digital media; digitization; binary code

Best Practices in Teaching Summary

Rationale

Media users and creators typically encounter digital forms that are "designed to be experienced by humans" (Taffel, 2019, p. 13); however, the actual code processes that facilitate this experience are, per Taffel (2019) "often invisible and unfelt" (p. 13). If a digital media producer does not have experience in computer science or coding, they will likely understand their work only at the visible level; that is, only what was designed to be seen by humans. This is somewhat akin to being a tattoo artist without knowledge of the processes occurring beneath the skin to make the tattoo permanent: It is certainly doable, but an understanding of the underlying system makes for a more informed creation. Thus, the purpose of this classroom activity is to provide students with the tools to grasp higher-level concepts of digital media production by introducing binary digits (bits) as the foundation of digital media recording and storage (Goodman, 2002). In understanding binary, students can understand bits and bytes (and the more common collections of bytes: kilo-, mega-, giga-, and so on). Therefore, they gain a more robust knowledge of digital recording processes and how these processes affect storage.

Because they are such a foundational digital concept, binary digits should, in theory, be part of any school curriculum (Bell & Hickman, 2024; Feaster et al, 2012). In the American context, 32 of 50 states currently require that computer science be offered within K-12 curricula; however, a 2025 report by the State of AI & Computer Science Education shows that only 6.1% of high school students actually took a computer science class (Code.org, 2025). In other words, it is unlikely that students, regardless of their media production background, would also have been introduced to basics of digitization.

I drew on my own experiences using "concrete materials" to learn mathematical concepts as an elementary school student in a Montessori classroom (Frierson & DiPaolo, 2025, p. 196). Scholars of Montessori education often point to the aim of helping children understand the essential nature of such concepts rather than math as simple inputs and outputs (Freierson, 2020). By making binary digits physical and using beads as stand-in 'bits, ' students can 'see' how basic digital processes work.

Theme

While it may seem incongruous to use elementary-level education techniques in a higher education setting, the course this activity is part of was designed as a true introduction to digital media production. Thus, I follow inclusive practices and do not assume prior student knowledge. The activity is aimed towards demystifying computer processes by bringing students to the root of digital information. It is a

way of promoting digital literacy through emphasis on fundamentals. Binary underlies all digital information, including artificial intelligence inputs and outputs. If we as instructors can make largely invisible processes more visible, we can help students develop a more healthy and informed relationship with digital technology.

Learning Objectives

- Students will understand the makeup of digital files at the foundational level of the binary digit.
- Students will be able to explain factors that affect quality of digital audio recordings by distinguishing between sampling rate and bitrate.

Both of these learning objectives align with the ACEJMC Professional Value or Competency to *effectively and correctly apply basic numerical and statistical concepts*.

Description of the Activity

This activity is part of an Introduction to Media Production course required of Film & Media Studies majors and Multimedia Journalism majors. In designing this course, I wanted it to be a true introduction. I sought to teach students precisely what it means for something to be digital. Early iterations of this activity started with the sampling rate and bitrate activity described below. Realizing that I needed to go even more to the root of binary and how bits reflect electrical voltage, I added the bead 'writing' activity.

The activity requires the purchase of materials: Pony beads (see Appendix) in two contrasting colors, and Ziploc baggies. These materials can be reused and are inexpensive. Add a minimum of 64 beads to each bag (so students can 'write' at least eight characters); the beads do not have to be equally distributed color-wise, but should be roughly equivalent. It is important to choose bead colors that are colorblind-friendly.

Students first must know that, in analog recording, a continuous sound wave is directly represented on a vinyl record (this is discussed in a previous class). A CD, though it is a physical object, contains digital recordings. They are not direct representations and require sampling of the original sound wave. In order to be written onto a CD, the continuous sound wave must be broken into discrete units before encoding and decoding, or the computer cannot "understand" the soundwave. In other words, the sound wave must be translated into binary code.

Binary code is, at its root, a reflection of high or low voltage states. There is either high voltage or low voltage. There is no in-between that a computer recognizes. In explaining this, I hold up a bead of each color. High voltage is represented as a 1; low voltage is represented as a 0. Each bead represents a bit, the most fundamental unit

of digital storage. Bits make bytes-strings of 8 bits that computers can "read." We first make text bytes with the bits. I find this chart to be helpful, and show it on the projector: http://sticksandstones.kstrom.com/appen.html. Students spend some time writing in binary code using their beads before putting the beads back into the Ziploc baggie. This introduces the basic idea of bits and bytes, as well as the idea that the order of 0s and 1s within a byte tells the computer how to interpret the digital information. We next return to the topic of audio and sampling. To explain sampling in the recording process, I ask students what it means if they sample a meal (they take a small bit of it in order to get a sense of the whole). We can then connect this to how digital audio sampling works. Sampling rate measures how many times a sound wave is sampled per second in order to recreate that wave in digital format. To demonstrate this, I ask students to pull a bead out of the bag when I clap[1]. We do this at different rates to emphasis that higher sampling rates convert more sonic information into digital bits. We end with a demonstration of bitrate: How much information is pulled per sample. For this, I ask students to pull two beads out when I clap. We can then discuss how higher-quality audio can be recorded with higher sampling rates and higher bitrates—but it will take up more digital space. Students can see how 'digital space' gets taken up by the 'bits.'

Evidence of Learning Outcomes

Students take a tech quiz through the Canvas learning management system two weeks after the binary activity. They are allowed to refer to the class slides as they take it. Three of the questions in this quiz reference digitization, binary code and sampling rate/bitrate. The sampling rate/bitrate question explicitly asks students to reference the bead activity in their response. Examples of correct responses on the most recent quiz are included in the Appendix.

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[1] Around this point in class, I emphasize that actual sampling rates take tens of thousands of audio samples per second, and that our demonstration is a generalization. We discuss sampling rate in terms of kilohertz the following week.

References

Bell, T., & Hickman, H. (2024, October). Why Teach About Binary Numbers?. In *International Conference on Creative Mathematical Sciences Communication* (pp. 130-135). Cham: Springer Nature Switzerland.

Code.org (2025). *2025 State of AI + CS Education*. https://advocacy.code.org/report-data/

Feaster, Y., Ali, F., & Hallstrom, J. O. (2012, July). Serious toys: teaching the binary number system. *Proceedings of the 17th ACM annual conference on Innovation and technology in computer science education* (pp. 262-267). https://dl.acm.org/doi/10.1145/2325296.2325358

Frierson, P. (2020). Intellectual agency and virtue epistemology: A Montessori perspective. Bloomsbury Academic.

Frierson, P. R., & Paolo, L. D. D. (2025). Montessori, math, and materials: a case of extended cognition. Synthese, 205(5), 197. https://doi.org/10.1007/s11229-025-05014-6

Goodman, J. (2002). Digital storage. EBSCO Knowledge Advantage. https://www.ebsco.com/research-starters/computer-science/digital-storage

Taffel, Sy (2019). Digital Media Ecologies: Entanglements of Content, Code and Hardware. Bloomsbury.

Appendix A
Select Lecture Slides

Appendix B
Sample Student Answers (Tech Quiz, February 2026)

Quiz Question

When you create an analog sound recording, you create a physical version of a sound wave. For example, to create a vinyl record, the sound wave is inscribed onto the record so it can be played back later. When you create a digital sound recording, what must happen to the sound wave during the recording process? (In other words, what is the sound wave converted to?

Student Answer

The sound wave is converted into binary data, which is the 0s and 1s that we discussed in class and saw for ourselves when we did the activity with the beads. Then, the information from the sound wave can be translated to computer language and used digitally.

Quiz Question

What makes bitrate different from sampling rate? Please use the beads example in your response.

Student Answer 1

Bitrate is different from sampling rate because the bitrate was the amount of beads we took out at the same time while the sampling rate was how many beads we took out in the second/time. For example, taking out two beads per second is a bitrate of two. Then if the sampling rate is one minute long then we take out two beads every minute. Sampling rate is the frequency and how often we take out the beads while the bitrate is the amount of beads we take out.

Student Answer 2

In the bead activity, the sampling rate was how often we picked a bead to show the sound, like taking lots of tiny snaps of it. The more times we picked beads, the more accurate the sound was. The bitrate was how much information each bead used to describe the sound.

Appendix C
Pony Beads Prior to Sorting Into Two Contrasting Colors Per Bag

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