Supporting ethical and cultural competency development in cross-disciplinary information education in Germany

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ABSTRACT

This paper discusses development, teaching, and learning of a graduate level course on information ethics in a German academic setting. It provides an overview of student and course learning objectives, course design, approach to student engagement, assessment, and educational activities. The educational environment was cross-disciplinary between library and information science informed information ethics and computer science concepts and applications. Learning and teaching were contextualized to AI in medical domains, to support focus of educational environment. Ethical and cultural competencies were incorporated into course design to support application of information ethics in design choices, alongside European and United States guidelines on ethical AI. This paper also discusses experienced challenges to balancing disciplinary perspectives and European and North American pedagogical approaches. Specific, identifiable opportunities for future course expansion to support interdisciplinary, ethically, and culturally informed professional education are discussed.

ALISE RESEARCH TAXONOMY TOPICS

information ethics; pedagogy; curriculum; information system design; artificial intelligence

AUTHOR KEYWORDS

cross-disciplinary education; teaching practice; ethical competency; cultural competency

INTRODUCTION

Several scenarios have been posited on the likely introduction of artificial intelligence (AI) into library work and processes (Cox, 2023; Cox & Mazumdar, 2022) with ethical implications potentially undermining professional ethics (Cox, 2022). Professional education including topics of AI and information ethics therefore becomes equally likely and critical to the continued role of the information professions in society (Tait & Pierson, 2022). Beyond a fundamental understanding of the technological processes underpinning AI, such education will also necessarily impact professional competencies (Cox, 2023). iSchools, for example, are increasingly incorporating topics of informatics and health data sciences into curriculum (e.g., University of Illinois Urbana-Champagin School of Informaiton Sciences, 2023), while technically oriented information education, such as computer science, continues to debate the place of ethical competencies in curricula (Weiser et al., 2022). Interdisciplinary and cross-disciplinary collaboration in research and education will therefore be necessary for advanced technology development (Awad et al., 2020). Information education of ethical and cultural competencies, particularly at the intersections of information and computer sciences, will have a significant role in contributing to advanced technologies development, which stand to impact information ecosystems and institutions.

Ethical competence is the ability to understand between right and wrong and to act in accordance with this understanding (Menzel, 2016), frequently within context. Professions often utilize a form of normative behavioral expectations, such as through codes of ethics or conduct (American Library Association, 2017; Association for Computing Machinery, 2018). Community diversification suggests that data will need to be similarly diverse to adequately represent communities and avoid ethical and practical harms (High-Level Expert Group on AI, 2019; International Federation of Library Associations, 2012; White House Office of Science and Technology Policy, 2022). Ethical technological development therefore requires cultural competency: the ability to form meaningful social relationships, including working and interacting, with and among people from varied cultural backgrounds (de Guzman et al., 2016). The benefit of combining cultural and ethical competencies in AI education, for example, has been similarly been suggested (Sanusi & Olaleye, 2022), while cultural competency, for example, supports acknowledgement of Indigenous knowledge systems in technology design and information services (Bala et al., 2022; Dalvit et al., 2008; Rivera, 2013).

This paper discusses the design and development of an original course, *Foundations of Information Ethics*, whose aim is to provide computer science students with an introduction to library and information science-informed information ethics. It will provide an overview of teaching and learning context, the developmental process, teaching and engagement approach, and offer a discussion on challenges and opportunities in an international, interdisciplinary educational context. Library and information science (LIS) perspectives of information ethics were core to the creation and teaching of this course, complemented with literature from computer science, medical science, and news articles reflecting real-world scenarios. Cultural and international themes were embedded into the class design and emphasized throughout the learning experience, complementing development of ethical competencies and self-awareness in developmental contexts. This paper ends with a reflective discussion on integrating multiple pedagogies and themes into a coherent course, challenges encountered, and opportunities for strengthening course design and coverage.

CONTEXT

The course was developed within a European higher educational and laboratory-based context. Among the aims of the lab are a focus on responsible AI systems development, within medical application. Specifically, responsibility refers to the concepts of interpretability, fairness, and accountability, with the aim to operationalize them in technical projects, e.g., fairness measures in machine learning algorithms. These concepts informed course creation and are reflected by explainability, equity, and responsibility in course themes reinforced by the ethical principles underpinning the European Commission's Ethics Guidelines for Trustworthy AI (High-Level Expert Group on AI, 2019). There was an inherent requirement for interdisciplinarity in design. With an emphasis on information ethics related to AI and further contextualization toward medical applications, multidisciplinary literature and literature reflecting globally and culturally related topics were identified, with a central focus on ethical concerns, particularly at the intersection of information, people, and technology.

STUDENT AND COURSE LEARNING OBJECTIVES

Student learning objectives were developed first, with subsequent identification of course objectives, course content and materials, and assessment form and technique. The student learning objectives were, that over the course, students will:

- Apply principles of information ethics to relevant scenarios and cases.
- Develop ethical analytical skills.
- Identify and analyze ethical issues associated with the use of AI/ML in healthcare.
- Develop ethically reasoned solutions to issues of AI/ML in healthcare.
- Apply various ethical theories and frameworks in analysis.

Course learning objectives were framed as exploration areas, meant to provide high level understanding of what topics and additional skills students would develop in the course. Students will explore:

- What is information ethics? Why is it useful?
- Introduction to ethical theories and frameworks.
- Information ethics applied to specific issues, e.g., human rights, information access, privacy, cybersecurity, etc.
- Scholarly and news media literature on discussed/documented issues with AI/ML, including AI/ML causing/being used in ethically problematic situations with a progressive focus on medical applications.
- Thought experiments and trolley problems, whose reasoned analysis will draw on information ethics principles.

COURSE DESIGN

Course content was arranged thematically, moving from introductory to specialized focus. Weekly course topics aimed to support the student and course learning objectives through development and application of skills, e.g., ethical reasoning, in balancing introductory and contextualized readings and materials. Topic areas were intended to be diverse to expose students to a wide variety of issues relevant in technological design in an increasingly complex world.

The primary focus of the course is information ethics as it relates to AI, with a progressive contextualization to medical contexts. The medical context as a use case served to highlight sensitive domains in which AI is being developed, and thus the ethical and practical potentialities – both dangers and benefits. Thematic relevance was high between the domains of information science and computer science. The congruence between traditional information science domain foci, e.g., information access, and computer science topics and themes in technologies development highlights the shared aspects of the respective domains in addition to the broad applicability of information ethics from an LIS perspective. With emphasis on the intersection of information, people, and technology (Burgess & Knox, 2019), information ethics bridges disciplinary boundaries with a user-centered perspective, while offering educational enrichment and opportunity for students in a program with a highly technical focus. The weekly themes explored were: What is information ethics? Why is it important?; Human rights and AI; Information Access; Privacy; Medical Ethics & AI; Data Ethics; Cybersecurity; Cognitive Justice & Intercultural Information Ethics; Global Digital Citizenship – Developer's positioning relative to public and private sectors; Emerging Issues; and Putting Ethics into Practice – Exploring two proposed methods for ethical analysis.

Course design adopted a flipped classroom approach relative to disciplinary and educational setting. The traditional approach in this context situates a lecture period on a given day with a practical lab or seminar component on a following day. The typical duration is approximately 1.5 hours each. Topic, content, and approach of this course necessitated designating traditional lecture periods for independent engagement with weekly materials and readings, complemented with lecturing period during lab/seminar times. Weekly materials for independent engagement aimed for no more than two hours of time to align with class time allotment. Readings would typically take the form of a chapter of the course textbook (Burgess & Knox, 2019), a scholarly article, and a vetted news article, usually within popular science, technology, or general news related to the weekly topic.

Lectures were designed to oscillate between review and expansion of salient topics from the readings by the instructor, and student discussion to provide in-class space for students to synthesize material and whose outputs were incorporated into subsequent lecturing. This design approach was purposeful to create a co-constructed learning environment. In addition to reviewing course content, emphasis was placed on students' discussion and analysis of prompt questions introduced in class and derived from readings. This emphasis also relied on eliciting student lived experiences from both professional practice and cultural backgrounds, as it related to the weekly topics and educational goals. While discussion-based learning formed a basis of the course, sharing of lived experiences was voluntary, supported by clear expectations of respectful engagement.

ENGAGEMENT

Expectations on engagement were provided in the course description and syllabus and reiterated the week prior to the start of classes via the course management software, class

wide email, and in the first class session, i.e., "content and discussion in this course may at times engage with difficult topics. Students are expected to be prepared to discuss the weekly readings and topics and engage thoughtfully, empathetically, and respectfully with their peers."

Multiple forms of engagement with material and students were designed. In-class discussion formed another basis of course design. Discussion would often alternate from among students to students querying the instructor. To expand on the course material and support development of ethical competencies and the learning objectives, prompt questions were introduced in class and derived from readings. The questions ranged in detail and from analytical, reflective, ethical and cultural emphasis. Table 1 provides examples of questions used in the course, according to week, topic, and framing.

Table 1. Example prompt questions.

Week, Topic	Prompt Question
1, What is information ethics? Why is it important?	Is it possible to develop "universal values" information societies can adopt without encountering the problematic issues of globalization, colonialization, and the support of one culture at the expense of others? Consider the values that are woven into AI/ML development.
3, Information Access	The concept of "collective ownership" of clinical data, where patient clinical data is "co-constructed", and does not to justify private property claims from either patient or entity (Ballantyne, 2020) Is this argument ethically justifiable from your perspective? Why or why not?
5, Medical Ethics & AI	Does [medical practitioner's] duty of care extend to the developers of AI to be used for medical purposes?
6, Data Ethics	Several regulatory and governmental approaches attempt to address algorithmic bias in datasets, e.g., best practice guidelines, review board oversight, FDA & AMA initiatives. - Consider how you – as a developer in this context – would personally contribute to bias reduction. - What is a personal motivation you would have to do so? - What is an ethical motivation you would have to do so?
8, Cognitive Justice & Intercultural Information Ethics	Traditional practices, ways of knowing, and "body, mind, spirit, heart" are cited as traditional elements of health practice of many Indigenous peoples (The Globe and Mail, 24 November 2021). Developers, companies, industries will need to work with individual communities to understand how best to do this. It must be acknowledged that working with Indigenious and margianlised communites is necessary, it is not a 'nice to have.' - Consider how these elements could be incorporated into AI in medicine. - How would you find ways to incorporate these elements into such an AI? - How can such technology acknowledge and respect "Indigenous identity, trauma, and resilience"? - What would we need to consider in order to incorporate an Indigenous and other marginalized worldview(s) in AI, and how to be respected and valued?

To support independent engagement with weekly materials and in-class discussion, a range of activities were designed using a range of resources in digital and non-digital formats, prioritizing open access materials. Similarly, activities utilized a mixture of in-class discussion, group work, presentations, and written assignments.

ACTIVITIES AND ASSESSMENT

Activities were designed to complement topic while providing students with varied methods to support comprehension. Table 2 provides an outline of selected activities.

Table 2. Selected activities.

Week, Topic	Activity
3, Information Access	• Students to draft criteria by which information (medical data for algorithmic development) is made accessible. • With the perspective of AI development and Information Ethics, students are to choose an ethical theory to guide criteria development. • Students are to save these criteria for the following week. • This activity was contextualised to the readings, in which "collective data ownership" for clinical data (Ballantyne, 2020) is contrasted with an example use of commercialisation of clinical data (Etherington, 2011).
4, Privacy	• Students to map Solove's (2005) taxonomy of privacy to Mello and Wang's (2020) policy proposals on digital surveillance during pandemics. • After mapping the taxonomy to at least one of policy proposals, students will compare the previous week's information access criteria with the framework mapping and asked to consider: What, if anything, would need to change in their criteria? • The aim in comparison is to highlight both the additional considerations around privacy and privacy violations and the usefulness of mapping conceptualisations of privacy to assess the costs associated with a regulatory or developmental choices.
5, Medical Ethics & AI	• Thought Experiments: Trolley Problem, The Violinist, and the Organ Donor (via videos available online (YouTube)). • Group discussion after each video. Students to draw on personal reactions first, then ethical frameworks to support and/or critique the problems and individual stances on their "solutions."
8, Cognitive Justice & Intercultural Information Ethics	• Students to work in groups to explore the Centre for Wise Practices in Indigenous Health's webpage (Women's College Hospital, 2021), making both social and technical observations. • Students are to consider how they might change or reconsider their answers to in-class discussion questions based on their observations (see: Table 1, Week 8). • Students are further prompted to consider the following: Start from social thinking and move to technical thinking. Even if you must be vague at the moment, outline your observations; What would need to be included in AI development to integrate elements of Cognitive Justice/Intercultural Information Ethics, etc.?; What steps would be necessary?; How could these elements be implemented?

Student learning objectives formed the basis of student assessment. Informal assessment took place within class during discussions. Often students were asked to elaborate on their central argument and the reasoning which led to their conclusion. To provide them with opportunities to defend their reasoning and explore their understanding of course content, students were challenged with changes in contextual details in ethical scenarios and thought experiments, either by the instructor or by fellow students. There were two primary reasons for changing contextual factors: first, for students to demonstrate in-the-moment reasoned, ethical analysis according to an ethical framework of their choice; and second, to demonstrate that contextual factors will often be relevant and illuminate limitations of a given ethical framework, encouraging flexibility and agility in thought. For the final assessment, the student learning objectives formed the basis for the grading rubric. The final assessment was an essay, 4000-5000 words, addressing a thought experiment written by the instructor.

DISCUSSION

It is important to note that this was the first instantiation of this course. Development of ethical competencies was the purview of this course, and thus supported by readings, in-class discussion, and activities. Development and inclusion of cultural competencies was embedded to be a consistent, related focus to support ethical competency development. Cultural context played a prominent role in thought experiments while exploring certain ethical principles and frameworks. Change of cultural contexts within in-class discussions supported students' abilities to account for cultural factors while negotiating ethical frameworks and their limitations. This was particularly useful in discussing intercultural information ethics and cognitive justice, which was contrasted with normative approaches to ethical behaviour and technological design. Additionally, the course literature featured a multicultural and global perspective. In-class discussion often included authentically and responsibly eliciting student cultural and professional experiences, encouraging diversification of thought.

LIS disciplinary perspectives in information ethics guided the course design and teaching. With a focus on information relative to people and technology, rather than solely on technological design, emphasis was consistently placed on the people and societies 'on the other side' of the developmental process and of the technologies in use. The core values of librarianship also informed teaching approach, as the instructor adopted the perspective of advanced technological design as a form of information service and provision (American Library Association, 2019). The value of service for example, often came through with the emphasis of technologies as being of use by people, and thus development requiring ethical scrutiny (such as through the quality and limitations of datasets). Other values such as access, privacy, diversity, and social responsibility were also emphasized either through weekly topics or as occurring in in-class discussion (American Library Association, 2019). These values complemented the focus of discussions and shared commonalities with issues in computer science. Commonalities in disciplinary foci suggest rich potential for cross-disciplinary informed pedagogy focused on ethical and cultural competency development.

CHALLENGES

In reflecting on the design and delivery of this course, the author considered four primary challenges to address with opportunities to strengthen its next iteration.

Challenge 1: Balancing European and North American pedagogical approaches, including culturally and individually situated learning (Shi & Blau, 2020). In the German tradition, educators contribute to students' *Bildung*, a holistic concept relating to cultivation and education, through their individual interpretation and adaption of curriculum (Hudson, 2007). Balancing Didatik approaches with, for example, the Socratic Method required acute instructional sensitives, while encouraging communal dialog to promote critical reflection on individual suppositions within ethical frameworks and worldview.

Challenge 2: Balancing LIS and computer science materials and disciplinary approaches within the information ethics focus as applied to a techno-medical context. Striking a balance among these core foci presented a challenge to creating a coherent course in service of *Bildung*. Approaching introduction of content, themes, and complexity required

a dual, calibrated approach. Use of thematical arrangement of topic, e.g., by week, was utilized with a progressive focus on techno-medical and ethical cases. Course materials were carefully balanced to maintain educational focus.

Challenge 3: Balancing theoretical and practical ethical material. Developing ethical analytical skills and competencies often relies on thought experiments and understanding the premises of respective frameworks. To support application to real-world scenarios, the inclusion of vetted news articles helped situate weekly themes and overall discourse (e.g., Anadiotis, 2021; Etherington, 2021; The Globe and Mail, 24 November 2021). Material was additionally supplemented with instructor experience. For example, the instructor's experience cataloging in varied international organizations was used to underscore differences in controlled vocabulary, meaning, and historical issues of exclusion associated with certain terms; this was contrasted with machine learning classification methods predicated on a narrow understanding within a given culture and society.

Challenge 4: Access and readings. To ease the burden of access, open access and freely available resources were prioritized. Similarly, buying textbooks is not necessarily the norm in the instructor's educational context. To support student access, the instructor liaised with the university library to provide digital copies of the textbook. Finally, cultivating cultural competence would have been limited were the course to have been culturally homogeneous. This suggests alternative measures will need to be designed for future iterations.

OPPORTUNTIES

Challenges, the experience of teaching the first iteration of the course, and student feedback via course evaluations have led to the instructor identifying several opportunities to strengthen aspects of the course. These include:

- Refine and expand learning and course objectives to explicitly include cultural competencies.
- Expand course coverage to include increased intersectionality of race/ethnicity, gender/gender expression, and sexuality.
- Incorporate multiple contextualization focal points outside of the techno-medical, e.g., information and cultural institutions, sustainability, and professional ethics among multiple professions.
- Adding activities and assessments for a reflective approach to competency development.
- Increase student-led activities within the learning environment.

Additional opportunities include:
- Framing course learning objectives as objectives, rather than exploration areas.
- Making explicit the relationship between the student learning objectives and the course objectives.

CONCLUSION

This article as outlined the design, development, and pedagogical approaches used in a master's level information ethics course from an LIS perspective for computer science

students in Germany. Ethical and cultural competency development was supported through grounding course aims and approaches in the human-centered info-ethical approaches and internationalization of course content. As a first instantiation of this course, a number of challenges were encountered, which have led to identifying opportunities for strengthening its next iteration.

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