Computers and Education Open 9 (2025) 100281

Contents lists available at ScienceDirect

Computers and Education Open

journal homepage: www.sciencedirect.com/journal/computers-and-education-open

Understanding use of evidence in AI ethics guidelines development through a PRISMA-ETHICS informed scoping review of guidelines

Simon Knight

University of Technology Sydney, TD School, Ultimo, NSW 2007, Australia; UCL Knowledge Lab, London, UK; Digital Futures, Stockholm, Sweden

ARTICLE INFO

Keywords:
Ethics guidelines
Research ethics
AI ethics
Scoping review
Ethics review

ABSTRACT

Objectives: There have been recent calls for new ethics guidelines regarding the use of artificial intelligence in research. How should we go about developing such ethics guidance documents with respect to emerging contexts such as new technologies, and established domains such as research in education? This paper provides a PRISMA-ETHICS informed scoping review of approaches to ethics guideline development, the structures of ethics guidelines, and their audiences and purposes drawing on the context of education and AI.

Search and synthesis approach: A search of scholarly and grey literature was conducted to identify both ethics guidelines and material discussing their development; $n = 592$ distinct items were identified, including 182 that identified via recent reviews of AI ethics guidelines. $n = 47$ guideline-sets were identified as 'guidelines'.

Data extraction and analysis: Guidelines were analysed with respect to their development approach, audience and purpose, and structural elements through which guidance is delivered; most included statements regarding their development approach (79 %) and audience (72 %). Where evidence underpinning the guidance was discussed, it was largely at a global content level (69 %), rather than with respect to the specific context/domain of the guideline use, principles drawn on, or approaches and strategies one might adopt in navigating ethical issues (23, 29, and 21 % respectively). Across the guidelines the only universal feature was the provision of an overview statement. We conclude with recommendations regarding the development of ethics guidelines, and their structure.

Funding: No external funding was received.

Systematic review registration: The review was not pre-registered.

1. Introduction

1.1. Governing artificial intelligence: the role of ethics guidelines

Emerging technologies such as Artificial Intelligence (AI) alongside societal changes present novel challenges for ethical research and practice across disciplines, including education. Ethics guidelines provide one material resource to represent and guide practice. However, the emerging nature of issues such as AI represents a challenge insofar as strategies represented in existing guidelines may not align well with emerging needs, or adequately represent changes in cross-disciplinary consensus regarding navigation of these needs.

The distinctive features of AI that present challenges for ethics governance include: (1) aligning principles of research ethics to models of research in which the interaction is between researcher and data-subject, rather than directly between researcher and subject (or participant); (2) navigating and establishing norms regarding the principles of use for AI and data; (3) assessing unexpected or soft impacts; and (4) inter-organisational issues including the need for norms of governance across collaborating bodies (including universities and industry bodies), and transparency where corporate entities may fund or be involved in research [3–5].

This has led to recent analysis of, and calls for, guideline development in the space of AI across research spaces, including in education research [6]. In research, specific calls have included proposals to develop journal policies regarding AI ethics in education [6], reflecting wider disciplinary concern regarding editorial guidelines for emerging technologies [7]. However, there is a wider need, with analysis of indexed education journals indicating that approximately three-quarters do not have polices regarding broader human research ethics [8], a concern reflected across disciplines [7].

Across wider domains of research and practice a wide range of AI ethics principles and guidelines have emerged. These include editorial policies regarding ethics [7], reporting of AI incidents or cases [9], a set

E-mail address: Simon.knight@uts.edu.au.

https://doi.org/10.1016/j.caeo.2025.100281
Received 30 March 2025; Received in revised form 3 August 2025; Accepted 4 August 2025
Available online 7 August 2025

of recent reviews of principles and guidelines [10–13], and two recent large EU projects relating to AI ethics (the SHERPA [14–20], and SIENNA [18,21–24] projects). However, despite this breadth of materials, their particular aims and the methods underpinning development of guideline material is unclear. Reviews of these documents have typically focused on their authorship (internationally, organisational context, etc.), and the key values expressed in them. As a 2023 review of ethics toolkits notes, analysis of these materials provides insight into how their authors conceive of what engagement with ethics involves [25]. However, no analysis to date has investigated the structure of guideline documents towards providing guidance on ethical action. Nor is there clear analysis in wider practice of guideline development of the approaches taken for creating guidelines, and the way these outputs might draw on evidence and evidence synthesis methods. In practical terms, it is not clear how one should go about developing ethics guidelines for AI, despite the apparent need.

To address the distinctive issues of ethical governance of AI, we can learn from the significant body of work in creating ethics governance systems for human, animal, and biosafety research committees [26] (research ethics committees,[1] RECs). RECs are established governance structures for the oversight of ethics in research in universities and in some industry organisations [27]. RECs are typically internal to an organisation, with some external representation, providing independent oversight of applications to conduct research against a set of agreed principles typically grounded in the Belmont principles [28] of respect for persons (or autonomy), beneficence, and justice. RECs have recently received popular attention as a potential governance structure in oversight of application of AI [e.g., 29–32], with a corresponding proliferation of ethics guidelines targeting AI. However, it is not clear how these guidelines might be used by industry and academic researchers, as well as RECs to navigate ethical issues.

In the wider research ethics space, ethics guidelines are used by researchers and research ethics committees – across universities and other settings – to support navigation of key ethical principles. Guidelines in this context are documents that are intended to support consideration of ethical concepts, the relevance of these concepts to specific contexts, and approaches or strategies for instantiating ethical behaviour, in a way that fosters ongoing reflection and evaluation. RECs assess applications against these principles, providing feedback where appropriate to the researchers, towards those aims. To support these processes, principles are expressed into guidelines, that are drawn on by REC communities in conceptualising and evaluating the ethical issues of work. At most general, these guidelines exist at a national level, for example in the Australian National Statement and their supplementary materials, setting out both the form of research ethics committees (RECs) and the principles they exist to oversee in research [33].

To provide more contextual guidance, organisations may choose to create material to support their communities in using and drawing on high-level guidance or principles. These contextual resources include specific guidance targeting particular disciplines or participant groups; supplementary materials that guide their stakeholders through application of principles; or more independent resources that speak to (a) the particular contextual features of the setting (e.g., ranging from concern for specific governance procedures, to relevant sensitivity to local power relationships and the implications of that for the research's place in society) or (b) the disciplinary context (e.g., at the learned society level, or within individual faculties at an institution). However, it is not clear how these guidelines are developed, for whom, and what kind of guidance they provide in learning to navigate research ethics.[2]

1.2. AI ethics guidelines

Despite helpful reviews of the large number of codes of ethics and guidelines addressing AI, it is not clear how these address the needs of guideline documents for REC communities. Guidelines from some learned societies exist, and provide helpful insight [e.g., 34,35]. However, there is no overview of these, and moreover there is mixed evidence regarding their connection to practice. Specifically, some evidence suggests that guidelines expressed as codes-of-conduct may not impact behaviour in practice [36,37], while others suggest exposure to ethical considerations and concepts in such guidelines does have impact in orienting stakeholders to these ethical issues [38,39]. This tension is perhaps a feature of a lack of consensus regarding ethical outcomes, approaches, and more fundamental norms with respect to research involving AI and data across the ethics ecosystem [40,41], suggesting a need for involving a range of stakeholders in codesign and ongoing update of ethical guidelines [42], and greater attention to sharing the ethical concepts worked with, and policies to foster this sharing, including through research outputs [7].

These calls for ongoing stakeholder-engaged development of guidelines are not distinct to the area of AI and data, although as technologies underpinned by AI and data permeate aspects of research and life, they become more pressing. Development of guidelines for AI and data technologies can learn from existing calls and tools, including resources created to share learning materials such as: guidelines and cases [9, e.g., 43,44]; examples of REC applications [e.g., 45,46]; specific examples of dilemmas [47,48]; and data regarding the kinds of methods, and potential for learning regarding ethical approaches from this, through REC processes particularly in co-design research [49].

These examples point to deeper consideration of the issues encountered in ethical conduct, use of ethical guidelines (by all stakeholders), and the potential for learning and development for guidelines across the ethics ecosystem. The benefit of such consideration in the specific context of this work is at least two-fold. First, by analysing existing materials with respect to the features of ethical practice they target for learning, we can identify both resources that may be drawn on in development of new guidelines, and where new guidance may build upon the significant lineage in previous ethics work, thus fostering uptake. Second, such an analysis allows us to investigate how guidelines in particular target topics – in this case, AI and education – may be situated with respect to other fields, and in particular where there may be gaps in coverage. Education was selected as the field here addressing three rationales: (1) theoretical – ethical issues are instantiated in particular contexts, and thus understanding how fields address the guidance for those contexts is crucial; (2) resourcing – focusing on a single field reduces the scope for analysis while providing insights that may be used in other fields; (3) pragmatic – the field is one area where AI will have impact, and for which the authors have expertise and immediate need for guidance.

1.3. Approaches to guideline development

Although they play an important role in research practice, there is no well-established model for developing ethics guidelines, nor is it clear how widespread any set of systematic approaches, or moreover use of

[1] We treat RECs, Institutional Review Boards (IRBs), and Research Ethics Boards (REBs) as synonymous, using RECs in all places unless an alternative is used in a direct quotation.

[2] We are aware of the Guidelines International Network (GIN) and resources such as the 'Guidelines for Guidelines', however both target clinical practice, thus the former contains no ethics-targeted guidelines https://guidelines.ebmportal.com/?q=ethics and the latter is focused on guideline development for clinical context https://www.nhmrc.gov.au/guidelinesforguidelines/.

any systematic approach is, in the development of such guidelines [50]. While there are a small number of process guides for developing a code of ethics or ethics guidance in professional or organisational contexts [e.g., 51–53], these are grounded in the experience of those authors, and have relatively less to say regarding the material to be produced or the kinds of activity it might support.

The recent 'Use of Research Evidence to Inform Guidance regarding Normative-ethical Topics' (REIGN) framework, developed for the World Health Organisation, aimed to develop an evidence informed guideline development method to augment other empirically grounded guidelines [50]. As they flag in the context of health governance, decisions are entwined with ethical character with issues of risk of harm and benefits providing face-value examples, but an understanding of the value judgements that go into defining those harms and benefits (and for whom) providing deeper routed cases. The health domain has well established approaches to systematic decision making and guideline development and might be looked to for advice in other fields seeking to address questions regarding the balancing of ethical principles. However, even in the health domain, "it is remarkable that ethical issues are seldom addressed in these manuals for guideline development" [50 p 7].

In their proposal, modelled on evidence-based medicine, the REIGN framework invites guideline developers to address the meta-questions: (1) "For what (is evidence needed)?" (consequences of actions, arguments for actions, etc.) (2) "From where (is evidence gained)?" (sources, materials, methods, etc.) (3) "Which type (of evidence should be used)?" (regarding quality, 'level of evidence', etc.)" [50 p 49].

In their model [see, 50 p 49] guidelines might set out different forms of recommendation: (1) Substantive recommendations for/against particular actions; (2) Procedural recommendations regarding ways to avoid ethically problematic behaviour; (3) Design recommendations regarding how processes or organisations should be designed to support ethics. To these this paper adds (4) Learning recommendations, regarding how guidelines may support individual learning through guidance regarding ethical concepts and their application, institutional learning through guidance regarding implementation and evaluation, and public learning through guidance regarding the use of ethical concepts in public discourse in order to navigate complex – and perhaps intractable – ethical issues. Our view of ethics thus differs here in positioning guidelines not only as providing models for best actions/outcomes, but also as providing tools for local navigation of these issues over time and contextual variation. To develop recommendations (or approaches to address ethical decision contexts), a set of key ethics questions is addressed each of which may require evidence, for which they provide a checkbox approach to assessing: the relevance of evidence or its significance in addressing a need for guidance; the existence of knowledge bases to address this need now, or need for further evidence collection; and the proportionality of different approaches to gathering evidence (e.g., the cost associated with gathering new data). Table 1 paraphrases these questions and key evidence considerations towards providing a preliminary guiding step in consideration of initiating and focusing the development of ethics guidelines.

In addition to this guidance, two large EU projects ([54] and [55]) have investigated aspects of guideline development, providing useful considerations which are integrated and adapted for overarching guideline development requirements in Table 2, providing a model for understanding guideline structures, and correspondingly an initial model for analysis of guideline structures and aims in this study.

1.4. A gap: guidelines to ground guideline development

This article is motivated by a practical need: the authors were asked to create a research ethics guidance document. That request led to two general research questions regarding guideline development, alongside a third specifically focusing on a target context (§1.2). Expressing the questions in this way is intended to help separate the specifics of our topic (§1.2) from the more general inquiry, and to highlight how addressing RQ1–2 supports work in addressing targeted topics (RQ3)

Table 1
Key questions, developer considerations, and outcomes for guideline development adapted from (Klingler and Mertz, 2021, p. 50).

	Key question	Guideline developers should consider…	Outcome
1	What ethical principles guide us?	Principles used in the target decision-context, and evidence regarding the range of these that may exist	Statement of key principles, situating guideline for principles in use by community
2	What ethical concepts are used in this domain and decision context?	The range, and conceptual clarity, of ethical concepts used by people in this decision context, e.g. how is 'Transparency' understood in AI ethics?	Explanation and delineation of key concepts of relevance
3	What is the substantive need for ethics guidance? What are the ethically salient decision contexts to be addressed?	Why guidelines may be needed, what contexts they will guide action/reflection in and what makes them ethically salient (2).	A set of key sites for which guidelines may be useful; situates guidelines in practical need of community
4	What approaches are taken in addressing these contexts?	Practical approaches to instantiating or applying the concepts and principles in 1 and 2 to contexts from 3	Strategies for navigating ethical issues arising in cases
5	How might we weigh up or evaluate, in an ongoing way, different decisions and outcomes?	The context and impact of decisions and their evaluation with respect to key ethical principles and ongoing learning	Models for reflection and evaluation regarding ongoing ethical practice

RQ 1 What approaches are specified in the development of ethics guidelines?

RQ1 provides important information addressing a gap (outlined §1.3) salient to the grounding of ethics guidelines with respect to consensus in values or principles; their navigation and application in particular problem domains; and addressing of audiences for the guidelines and their impacts. By addressing the general question (without narrowing to a particular domain), the range of approaches that may be applied in particular domains is scoped. Through addressing RQ1, a lens is provided onto approaches adopted and where there may be gaps in these approaches.

RQ2 provides a lens onto the how guidelines are positioned to support their intended outcomes (introduced §*1.3,* particularly Tables 1, 2). It is addressed through understanding how guidelines position their target topics, and the salient features of ethics in that context (such as principles, strategies for action, etc.) as expressed in the material structures of guideline documents themselves.

- RQ 2 What features of ethical practice are targeted in guideline structures and what does this tell us about the targets of learning for guidelines?

To address these questions, a scoping review was conducted, informed by recent advances in methods for the review of normative and methodological features of research. In taking this approach, a distinction that is common in the literature is adopted, between guidelines and codes [50, for example, 56]. The former aim to provide resources to support ethical judgement, while codes are typically more prescriptive or/and focused on expression of key ethical principles than on ethical action. The focus of this paper is ethical guidelines.

Thus, our third topic-targeted research question

RQ3: What resources are available in ethics guidelines to support learning regarding AI and education?

RQ3 is addressed through the subquestions: (RQ3.1) For whom, and

Table 2
Requirements for the Content of Ethics Guidelines.

		Area	Key requirements to balance
0+	**Initiation**	New or existing	Use something existing, or develop something new: Decide through assessing appropriateness of existing codes/guidelines (1); the balance is between suitability to context of existing codes, which will need assessing (2), and the burden arising from new code development for clear task allocation and responsibilities (3)
1*	**Document focused**	Key concepts	Use of common language supports cross-discipline work; however, specific language may be required for clarity and precision
2*+		Usability	Brevity and signposting for usability (bullet points, headings, key info) may enhance uptake; however, detail may be required by some stakeholders to understand or operationalize.
3*		Readability	Style can enhance readability (media, visual design); stylistic choices should neither increase complexity of document nor decrease information.
4*		Interactivity	Interactive elements via links, case studies, normative exemplars (dilemmas, good/bad practice), and practical tools may support learning; consider how resources are provided for different stakeholder groups and the information burden.
5*		Overview	An introduction setting out the key overview may be useful; consider target audience and tone for any summaries.
6*	**Content focused**	Key concepts – glossary	A glossary may be useful; consider whether the way terms are defined limits/confuses their scope.
7*		Key concepts – further detail	Provide links to further detail regarding key terms (or, ethical concepts); as above, consider how definitions embed normative assumptions.
8+		Edge cases	Include examples of issues that are hard to regulate (E.g. social media data) as well as easier (8)
9+		Prescriptive v normative	Consider the balance of normative (advisory) and prescriptive (mandatory) status with respect to commensurate enforcement (7)
10*		Guidelines as pluralistic and stakeholder oriented	Consider the extent, and method, of expression of pluralistic approach to ethical practice for your stakeholders; balance process-focused requirements such as brevity.
11*		Ethical norms as stakeholder driven	Any ethical norms or values expressed should arise from stakeholder engagement, and have stakeholder buyin.
12*	**Process**	Guidelines as iterative	Consider how the guidelines will be evaluated, reviewed, and revised over time; consider the risk that changing guidelines may be perceived as not-useful, alongside the administrative burden (8)
13		Stakeholder engaged	Consider stakeholder consultation in development, dissemination, implementation, and updating (5)
14 *	**Ethics Ecosystem**	Guidelines as situated in wider practice	Connect the guideline to existing frameworks in practice, to help foster its use; note the challenge of contextualization given geographic and other variation in research frameworks, and the risk of being perceived as prescriptive if aligned to one/a few frameworks. (9)
15+		External lessons	Learn from personal data protection as a formally regulated area the effectiveness of which is grounded in: regulation; monitoring; penalties; expertise to apply the regulation and advise others (9)
16+		Embed ethics – individual	Build learning for ethics into practice, for all 'evidence gathering' professionals, and develop resources to support this (8)
17+		Embed ethics – organization	Adoption of the code must be a clear outcome of code development (10)

** Table element is adapted from Wilford* et al.*,* [54]. *Tensions have been re-expressed and collapsed into single column, area labels added, and the guidance re-expressed for a broader context than the GREAT project (*Governance for REsponsible InnovA-Tion) *it originates from. Where ordering has changed the sequence, the original is indicated in brackets in the description.*
+ element is adapted from Kokkinaki et al.*, "Recommendations for Code Builders, Adopters and Users."* [55 p 1] *in the PRO-RES (*PROmoting integrity in the use of RESearch results) project*. Elements have been reordered and 'staged', original numbers are indicated. Kokkinaki's item '4' is reflected in item '2' above.*

what, are the guidelines developed?; (RQ3.2) What structures are available to provide ethics guidance and opportunities for learning regarding ethics? (RQ3.3) To what issues is it anticipated the guidance will be applied?

2. Methods

2.1. Review approach

Scoping reviews provide a systematic method for an exploratory analysis of the literature to identify key issues and coverage in the literature, in contrast to systematic reviews which seek to systematically evaluate evidence regarding a specified issue, with recent work to specify reporting guidelines for their expression [57–59]. The model of a scoping review is appropriate for our context because the intent is not to systematically assess evidence for any particular issue, intervention, or context, but rather to assess the nature of issues in the literature and how widespread their coverage is. Specifically, this paper seeks to investigate the methods for development and structures in the output of ethics guidelines.

Approaches for review of specific parts of a research output, or expression of normative aspects of them, have recently emerged in the form of the methods review [60] and a recent PRISMA-ETHICS approach [61]. In these methods the intent is to probe how features of research are operationalised or investigated through analysis of output-sections that describe these issues (in the case of a methods review), or to understand the implicit or explicit normative considerations considered in the process, results, or outcomes of research (in the case of the normative review, and PRISMA-ETHICS).

Although reviews of normative features exist, a previous systematic review of these [62] indicated they typically do not report how normative information is analysed or synthesised. As Mertz et al., [62] highlight in the context of medical research and practice, in dealing with

challenges in this space the literature aims to evaluate moral reasons surrounding moral judgements. These reasons may be grounded in ethical theory, calls to intuition, and a range of forms of data that may include stakeholder surveys, assessments of harm/benefit, etc. There are also debates regarding the appropriate quality appraisal approach in review of normative literature, with recent work [63] suggesting minimal conditions via six questions: "what (the element or information in a text that is evaluated), which (which text; genre of the respective text), where (in the procedure of carrying out the SR), how (using which criteria or methods), whereby (the process of applying the criteria or methods) and who (which disciplinary or methodological background do the researchers need to have)." [63 p 9]. The PRISMA-ETHICS guidelines are intended to support systematising reviews of this literature, through standardised reporting guidelines for key aspects of a review [61]. A PRISMA-ETHICS checklist is provided in Supplement 1: PRISMA-ETHICS Reporting Guideline.

Guidelines act as a material resource that researchers, research ethics committees, journal editors and reviewers, and a range of other stakeholders work with as a boundary object [64]. Guidelines are both shaped by, and help to shape, our ethical practices and values acting as a key object for these negotiations. As such, a systematic approach of materials such as guidelines provides insight as through understanding these materials and the ways stakeholders may intervene upon and from them, we also understand the conceptual resources expressed by and from the guidelines.

Moreover, in the case of this research, an analysis of the methods of development, and structured expression of ethics guidelines, provides evidence that may be learnt from in future guideline development, and in research regarding approaches to guideline development.

2.2. Search strategy

2.2.1. Overarching approach

Eligibility criteria overview: Ethics guidelines have emerged in a range of contexts, with their emergence sometimes occurring with parallel grey- and scholarly-literature outputs, with the guideline providing the core document and the scholarly piece its impetus, development, and theoretical background. As such, this paper reviews both scholarly and grey-literature sources, in order to access both guidelines themselves and any research grounding, as well as any guidelines that have emerged in the literature (where they contain a clearly expressed guide for external use). For some guidelines, a scholarly description of their development was found through tracking citations; in other cases, the converse was true. In some cases, guidelines were either presented in scholarly publications (e.g. as an appendix), or, a scholarly discussion of their development was included alongside the guideline (e.g., in grant funded project reports). For this purpose, an operational definition was used as provided in the introduction to this paper:

A 'guideline' describes any document (regardless of title) that is intended to support consideration of ethical concepts, the relevance of these concepts to specific contexts, and approaches or strategies for instantiating ethical behaviour, in a way that fosters ongoing reflection and evaluation. Guidelines go beyond codes or sets of principles in providing discussion regarding their underpinning values and their navigation, they target practical action through their features (which may include specific strategies and example cases)

Search Strategy overview: Therefore, a number of strategies were taken comprising both scholarly indexes and grey literature. Due to the affordances of different platforms, a range of approaches was taken for search execution, and screening. Terms for scholarly database search were selected to narrow results based on the concern that broad terms (such as 'research ethics') returned many incidental mentions (i.e., phrases such as 'research ethics was approved by…'). Grey literature searches of specified websites (e.g., scholarly societies) were selected to be broad, e.g., using 'ethics' to identify relevant pages and materials.

The search strategy is intended to foreground guidelines where there may exist an available method, and to obtain a range of approaches taken in guideline development and instantiation. It is not intended to be exhaustive, but rather to represent the scope of approaches exhibited in guideline documents.

Quality Appraisal: No quality assessment was made of sources retrieved.

2.2.2. Venues / sources

Sources were identified through searches of scholarly indexes and general google searches. These were supplemented with analysis of reviews of relevant repositories such as the AI Ethics Guidelines Global Inventory, previous reviews of AI ethics guidance and principles, review of a set of EU funded projects regarding research ethics, and both institutional and scholarly society pages regarding research ethics. See detail Supplement 2: Detailed sources and data processing.

2.2.3. Inclusion and exclusion criteria

Searches were conducted for guidelines focusing outside the biomedical disciplines (see below). Items were:

Included if they:

1. Comprised an ethics guideline
2. Were directly linked to an ethics guideline as a supplementary resource (e.g., case studies provided in separate pdfs, 1 pager distillations)
3. Directly referred to a guideline development, e.g. where guidelines development was referred to in external publications

Excluded if they:

1. Comprised a set of principles, (addressing key q1 in Table 1) but without further guidance on the application of those principles
2. Were stand-alone supplementary material such as case studies (noting these were saved as linked documents where related to a guideline).
3. Focused on procedural concerns, or/and on wider research integrity, or non-research issues, rather than ethics
4. Set out some guidance for example within the scope of a published article, but without there then being an externally developed resource for use; or, made a proposal for guideline development but without doing so
5. Were not in English
6. Were not available to the researcher (either due to licensing, or lack of archival copy)

2.2.4. Searches conducted

Many items were retrieved directly via citation chasing within prior reviews, and related projects. A set of items were identified via google site searches (i.e., site:website.edu) on scholarly societies for 'ethics' or 'ethical'. A Scopus Title-Abstract-Keyword (TAK) search was conducted, in three variants of subject filters and expression, using the base search:

(*"research ethics committee"* AND (*toolkit* OR *guideline* OR *"learning resource"* OR *"professional development"* OR *"professional learning"* OR *training*))

All searches and item retrieval was conducted between 21/01/2023 and 24/05/2023 by the author. A comprehensive mapping of searches conducted, and the resources obtained via each can be found in Supplement 6: Items by search, with an overview of these using a modified PRISMA flow (Fig. 1), created with a modification of the R PRISMAstatement package [65].

2.3. Data management and processing

A procedure was used to search, track, manage, and annotate items, largely within the open source Zotero reference manager [66] (See

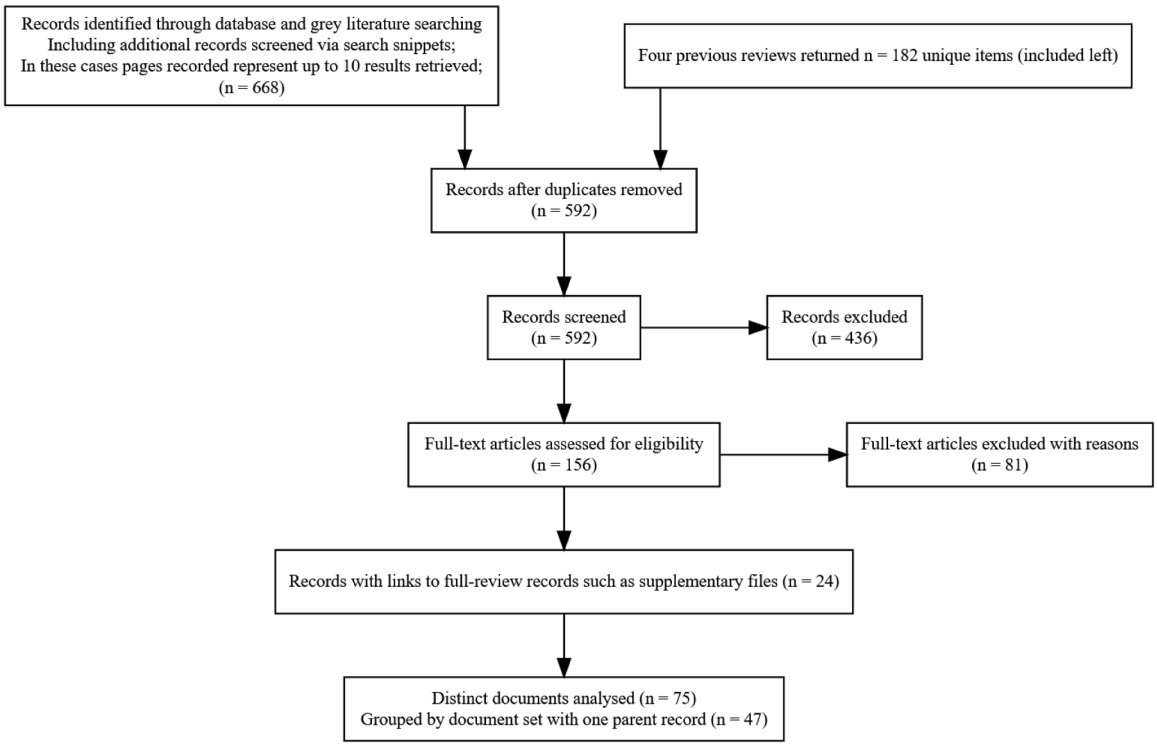

Fig. 1. Modified PRISMA Flow Diagram to provide overview of records searched, reviewed, and analysed. See appendices for a full mapping of searches conducted to items retrieved and analysed.

detail Supplement 2: Detailed sources and data processing). Searches conducted were recorded in Zotero with notes, with the items returned for that search stored in a collection. The Zotero annotation and note taking functions were used to extract and tag information from the items. All data extraction and analysis was conducted by the author.

Following the SIENNA project [reported, 24 pp. 7, and Annex 2], the following were extracted:

1. Who is the stated audience? – as tags, and in some cases through child-notes
2. How is the document structured? – as a child-note
3. Along with standard metadata (title, authors, publisher, year of publication) – within the Zotero metadata
4. In addition, the 'method' or approach to guideline development was extracted for each item where available.
5. The SIENNA fields: kind of document (defining a typology of documents), AI definition and forms of AI described, ethical issues addressed and how, and format of document, were not captured because these fields were not relevant in a consistent way across the non-AI based documents retrieved.

This data extraction is also broadly consistent with Wong et al.,'s [25] consideration of: the language used to describe the values of the ethics toolkit; the context of the work the toolkit is applied to; implementing the toolkit; and the organisational context of the toolkit users.

In the analysis stage, the *grouped* or *related* documents were treated as a unit of analysis. As such, the structures, audiences, and methods were extracted from each distinct item, but collated for analysis. Thus, where descriptive statistics are provided regarding the incidence of a feature, if one item in a set of related documents includes that feature, the whole related set is regarded as including it.

To address RQ3 a subset of materials underwent additional data processing involving:

1. **Data extraction** of (1) document principles, (2) identified challenges, and (3) concrete cases, alongside (4) strategies to tackle these**,** through a reading of the full documents and extracting notes with each note representing a single principle, challenge or strategy; these were then processed in a graphical table tool (airtable)
2. **Iterative thematic grouping and representation** of these items, to (1) map items to a shared set of high-level principles, in this case derived from the Australian National Statement on Ethical Conduct in Human Research, (2) identify commonalities across the documents, and (3) over multiple iterations, use an R script to export and process this data in order to represent it to support navigation between principles, challenges, and strategies, against the target topics (AI and education) in a webform. These iterations and living site can be viewed https://github.com/sjgknight/tonic-filtering/tree/multiymltest and https://ethics-guides.netlify.app/

Extraction and analysis processes used descriptive data matrices [67, 68], to chart the information extracted from items. This process involved versioning of matrices with notes (i.e., audit logs [69]). For descriptive text (audience, statement of development method) these were extracted into notes and then collated. Principles were first extracted from the set of recent reviews [10–12, 13;], with each principle as a row, and each document a column, indicating either that the principle occurred in that document, or that there was a close synonym or combination (e.g., "Responsibility and Accountability" was noted against "Accountability"), with researcher notes made against each principle, with four initial syntheses to identify a synthesised set of principles. Analysis related to RQ3 was conducted in tandem with two concurrent projects in which the principles, challenges, cases, and strategies extracted were connected within and across items (a form of triangulation [69]), and discussed in relation to those projects with the project teams (a form of peer review [69]); thus although much of this analysis is descriptive in nature, these findings are open to alternative interpretations.

3. Result

3.1. Description of guideline documents

Searches identified over $n = 592$ distinct items, with 182 identified in recent reviews of guidelines, and 413 via searches ($n = 3$ items also appearing in the reviewed 182 items [70–72]). The number underrepresents the results screen because some items (counted as a single item) represent multiple documents. For example, search results pages were saved as single item pages, with each item representing up to 10 single result snippets screened. This approach is consistent with recording for a scoping review, where as described in the Methods the aim is to demonstrate scope of coverage, rather than reproducibility in the retrieval process.

Across these searches:

- $n = 61$ distinct documents were identified as relevant
- these distinct documents were grouped into $n = 33$ items with a parent item (e.g., a single guideline, with an associated case study document)
- a further $n = 14$ items were identified from the 4 reviews of AI guidelines, for $n = 47$ units of analysis and $n = 75$ documents in total.

Notably, many of the items returned via the four recent reviews did not appear to provide guidance. It is worth repeating key terms from their foci: "principles for AI" [10], "AI ethics guidelines" [11], "Principles and Challenges" [12], and "guidance documents" [13]. Despite this focus, many documents appeared to present policy recommendations, roadmaps for AI adoption, statements of principles but little elaboration, etc. Indeed a supplementary search (using the Zotero full-text search, where ' %' is an elastic wildcard character, i.e., it matches for 0 or more characters), of the $n = 182$ documents, $n = 26$ were returned for a search of 'research %' ($n = 3$ of which were relevant), $n = 2$ 'evidence %' (neither of which were relevant), and $n = 21$ for a search of 'guideline %' ($n = 3$ of which were relevant, $n = 1$ of which was also in the 'research %' search). The documents retained from this set are thus the ones that are closest to the sense of 'guideline' intended in this review.

3.2. RQ1: how are ethics guidelines developed

Each document set was analysed as described in the Methods, to investigate their approach to development and intended audience. As Table 3 indicates, most guidelines included some statement regarding the approach taken to developing the guideline, and the intended audience of the guideline, although a significant number did not include such a statement ($n = 10$ and $n = 13$ for approach and audience respectively). Similarly, for those containing a statement they were typically in the 1–2 paragraph range, but with a large degree of variation including some with entire published works describing the method (it is for this reason no descriptive statistics regarding length are included).

An analysis of these statements was conducted using the REIGN model (see §1.3) to map the *guideline component* to *evidence approach.* It is worth reiterating here that the scope of any claims made from this analysis regards the *expression in the available documents,* and certainly is not an attempt to assess either rigour or appropriateness of approaches in fact taken. A full-text check was conducted to minimise risk of excluding relevant information.

Table 3
Presence of statements regarding approach to guideline development and audience for guideline from sample of $n = 47$ guidelines.

	Development approach statement (%)	Audience statement (%)
Included statement	37 (78.72)	33 (72.34)

Table 4 indicates the nature of evidence use in the guidelines, that is, where a specified approach was described, which component of the guideline it was specified as provided warrants for. This is important because the approach taken to guideline development, and the grounding of that approach in evidence, is likely to influence the content and impact of guidelines. The analysis indicates that most guidelines describe use of evidence with respect to the entire guideline (content-evidence), with fewer highlighting their approach to compiling evidence regarding principles selected, the context of the guideline use (e.g. why a guideline is needed, problem spaces it may be used in, etc.), or the approaches and strategies indicated in a guideline.

Of the evidence approaches described (see Table 5), 'consultation' was the most common evidence generation approach ($n = 19$ and $n = 16$ with stakeholders and experts respectively) and workshops were specifically mentioned in some cases ($n = 8$ with stakeholders and $n = 15$ with experts). A common approach was use of expert or committee development for the guidelines ($n = 11$). One guideline adopted a significant multi-stage expert consensus process that is well elaborated in external sources [see, 35]. A few guidelines referred to use of systematic reviews although it was not always clear how formally these were conducted, and in places particular analyses of key legal context including human rights law was noted (coded here as 'several single papers'). Approaches other than those discussed in the REIGN project were noted in $n = 12$ cases, including:

- Formalised-drafting-rounds ($n = 4$)
- Stakeholder-cocreation ($n = 2$)
- And each of the following, by one guideline: Iterative-rounds-of-feedback; Expert-adaptation-of-existing-materials; Formal-case-study-approach; Use-of-key-new-legal-context; WHO-process-drafting-iteration; Empirical-testing-of-Approaches

Across the guidelines analysed a range of approaches were expressed for their development, for a range of audiences. However, in a subset no indication is given regarding the development of the guideline nor the impetus for its development for a particular audience. Of the guidelines that do discuss their development approach, many refer simply to a working group or committee. While a number of other approaches can be identified in the sample guidelines analysed, even within this targeted set of documents (and their linked resources) the level of detail provided is often fairly minimal. The benefit of elaborating further here is that it would help to ground the values, challenges being faced (which provide the impetus for guideline creation), strategies, etc. in evidence from a community, with a clear indication of the strengths and weaknesses of the given evidence generation approach, and thus indication of how they might be further developed.

Grounded in this review of approaches, Supplement 3: Approach for Guideline Development provides a proposed model for ethics guideline development. This model sets out key desiderata for the development process, and its expression, for guideline development, with a view to support their use by stakeholders, and adaptability to context.

3.3. RQ2: how do ethics guideline structures provide guidance and opportunities for learning?

The documents were analysed for their inclusion of features of ethics

Table 4
Where evidence was drawn on in the development of guidelines (content-evidence indicates that an approach was described either without specifying a part of the guideline, or, it was indicated with respect to the whole guideline).

	Content-evidence	Contexts	Principles	Approaches
Mentions of approach targeting element	33 (68.75 %)	11 (22.92 %)	14 (29.17 %)	10 (20.83 %)

Table 5
Types of evidence generation drawn on in guideline development*.

Type	Method	Count
Literature based	Systematic Review	10
	Unsystematic or Narrative review	8
	Several Single Papers	7
	Single Paper ($n = 1$)	0
Expert based	Consensus process (experts, formal)	1
	Workshop with Experts	15
	Consultation (with experts)	16
	Commissioned Theory Application (expert analysis, e.g. by ethicist, philosopher, lawyer, etc.)	3
Other stakeholder based	Interviews/Focus Groups with stakeholders	3
	Opinion Survey	0
	Consensus Process (non-experts, formal)	0
	Workshop with Stakeholders	8
	Consultation (with stakeholders)	19
Other	Other (describe) [see immediately above table, and supplement]	12

*for mapping of evidence-document-feature please see supplementary files.

guidelines (see section 2.3). The coverage of these features is significant because the content of documents that are described as guidelines (explicitly, or in their inclusion in repositories of guidelines) provides a lens onto the topics that guidelines intend to provide guidance and learning for. As Table 6 indicates, all the documents did provide some brief overview that discussed issues related to the topic, intended audience, and purpose of the guideline. In some instances, this section was brief, and in particular $n = 13$ documents are included here because they briefly mention (perhaps in a couple of words) an audience, while they are not included in the preceding section because the statement provides no clear information about how the guideline might be used by that audience or who they are in any detail.

While guidelines vary in structure and length, many in the set analysed share some common features, although in places guidelines appear to omit key features that would support learning regarding ethical action. While most guidelines provided both a brief statement of ethical concepts (e.g., a numbered set of principles) and detailed description (e.g., elaboration of these principles and their importance), surprisingly a small number did not include such statements. Inclusion of other important information targeting actionability including examples of cases or edge-issues, and approaches or strategies one might adopt in ethical action, occurred in some guidelines ($n = 27$, and $n = 41$ respectively). Information regarding the rights that the material was published under was often not included ($n = 29$ included this information), and where it was included sometimes all rights were reserved. In these cases, there are challenges in adopting and adapting guidelines to specific contexts, because to do so inevitably requires repeating key information such as principles which may be considered 'substantial part[s]' under copyright law.

Supplement 4: Guideline Draft Template provides a proposed model for structured ethics guidelines. This template is intended to provide a structure that foregrounds key features – sometimes absent – from guidelines reviewed, and the ways these features combine to support learning to navigate the ethical context guidelines address.

3.4. RQ3: what resources are available in ethics guidelines to support learning regarding AI and education?

A set of guidelines were analysed with respect to specific target topics – Artificial Intelligence and Education. A subset was selected as: (1) targeting either AI, or education, or both; (2) openly licensed; (3) not targeting a specific country or contextual issue (e.g., narrow treatment of student data under particular legal context); (4) providing both principles and guidance.

As indicated in Fig. 2, from the results returned in earlier steps $n = 20$ focused on education, $n = 42$ AI, and $n = 5$ both, with $n = 77$ total. This includes 'related' documents, and some items that were excluded in earlier phases but were relevant to the specific topic addressed here. Of these relevant documents, $n = 29$ items were under some form of permissive license (creative commons, open government license, public domain, etc.), with $n = 9$ of these under a more restrictive 'no derivates' license which would prevent disaggregation and remixing of content. Of these $n = 12$ were identified as having narrow application to a particular domain, technology, or type of issue and excluded. At the time of analysis the US Department of Education published a highly relevant additional document, which was added for this stage.

3.4.1. Approach to analysis

The content of the subset of items was mapped, with each source stored with its metadata, and for each source each occurrence of a principle, challenge, case, or strategy, was extracted (see §2.3). These were each mapped together where possible with respect to their connections. That is, connections were recorded where possible through explicit or implied information, in order to connect *cases* to the *challenges* they instantiated, and the concrete *strategies* taken to navigate the *principles* at play. In addition, where there were significant similarities in content, these were consolidated, also allowing for cross-guideline connections to be built including for 'cases' to be mapped to 'strategies' arising from other guidelines.

Following this process, an initial 60 principles, 12 cases, 55 challenges, and 99 strategies (mostly short reflection prompts) were identified.[3] This process was then iterated, with consolidation of some items into a single representation, and mapping of both challenges and principles in higher-order clusters, to facilitate identification of cross-source relationships.

The stated aims of these guidelines were compared to the structures and materials provided within the guideline documents to identify commonalities, and gaps. In doing this, the intent was to explore who the guidelines were targeting as engaged in the work of ethics, and to understand the kind of challenges they were framed as encountering and strategies they might adopt to these, adapting Wong et al.,'s analysis of ethics toolkits [25], the analysis thus sought to summarise:

1. For whom, and what, are the guidelines developed? Through an overview of the audiences and target purposes of the guidelines.
2. What structures are available to provide ethics guidance and opportunities for learning regarding ethics? Through an overview of the engagement with detailed cases or edge issues/challenges and approaches or strategies to tackling these.
3. To what issues is it anticipated the guidance will be applied? Through an analysis of the way the guideline purpose, and challenges presented in it, is framed.

3.4.2. For whom, and what, are the guidelines developed?

Analysis of the statements of audience and purpose (Table 7) provides an overview of the returned resources. The aim of this scoping review has not been to target research specifically, but rather to scope approaches to guideline development and the resources available specifically regarding AI and education particularly that might be adopted/adapted across contexts through open licensing of material. As Table 7 indicates, given this focus, there are a relatively small number of guidelines, with elements of relevant material across them but no clear definitive guideline for the purpose. Most guidelines regarding ethics and AI are not intended for research uses or targeting researchers and ethics committees as audiences. While a small number of guidelines target education and AI, these are not focused on research either, and thus the specific challenges and issues of research in educational contexts, particularly where the research involves AI, may not be addressed.

[3] The initial commit was https://github.com/sjgknight/tonic-filtering/commit/aba4062791abeea331373713a05321e28b3cb615

Table 6
Incidence of features of ethics guidelines across target sample.

	Overview of topic, audience, purpose	Glossary	Rights / License	Ethical concepts brief	Ethical concepts detail	Cases or detailed application to edge issues	Approaches
Count (%)	47 (100)	15 (31.91)	29 (61.7)	44 (93.62)	42 (89.36)	28 (59.57)	41 (87.23)

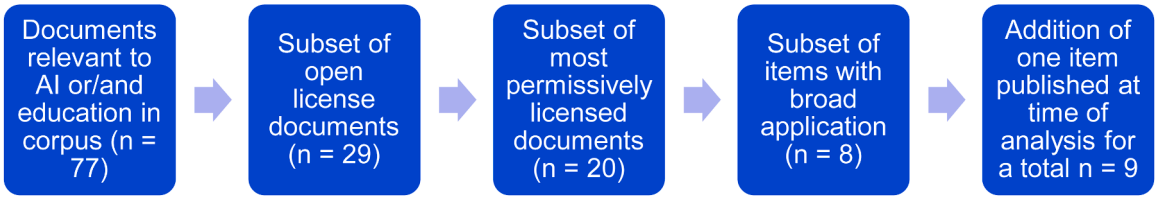

Fig. 2. Item selection for detailed mapping.

3.4.3. What structures are available to provide ethics guidance and opportunities for learning regarding ethics?

Building on the analysis in §3.3 the guidelines were analysed with respect to their inclusion of features designed to provide guidance. All provided an overview of their topic, audience, and purpose; some discussion of key terms; an indication of rights or license conditions; and discussion of the ethical concepts or principles underpinning them. Notably:

1. Five documents did not provide an overview of the ethics principles drawn on; in one case legal context was highlighted (human rights law), in another the national ethics framework was used, with the remaining three adopting a more discursive approach including highlighting the significance of non-prescriptive approaches
2. all provided detailed discussion of ethical concepts in the context of edge cases or challenges, highlighting the issues that may be faced;
3. all but one provided discussion of approaches or strategies that might be adopted in considering or navigating ethical issues; of the eight with this discussion, all used reflection questions ('key considerations' or 'guiding questions') with a mix of individual focus and explicit reference to group-based reflection, a range of other governance-based instruments was also referred to particularly by one source;
4. finally, three of the guideline documents provided detailed examples of *cases* or scenarios discussing ethical issues and their navigation.

3.4.4. To what issues is it anticipated the guidance will be applied?

The guidelines identified have different foci, and target different audiences, and it is thus inevitable that the kinds of issues to which they speak and challenges to which they anticipate being applied vary. Nevertheless, by investigating these stated challenges, we can gain some insight regarding the particular needs for guidance in an area – particularly in the context of emerging technologies, and their use in novel domains such as education. Comparing these identified challenges may also highlight gaps in the ways that emerging guidance conceives of the challenges faced in particular domains, for example understanding how the challenge of power dynamics between researchers who conduct research with/on their own students is framed in education, may have important implications in a context where those researchers may now engage with emerging technologies (which also open up new challenges of their own).

A set of overarching challenges was identified, under which specific challenge instances could be mapped from the range of documents. Notably, as Table 7 briefly indicates, while a range of challenges are discussed across the guidelines, for those focused on AI, the framing of the challenge of ethical AI is largely in terms of how to maximise benefits of AI use. That is, in framing the ethical challenge of AI, challenges are presented in terms of technically addressable features of the social context into which AI is being deployed, with strategies seeking to support navigation of this, rather than the challenges being presented in terms of the ethics of those very same underlying social contexts. In this way, the possibility of "not" undertaking (research) work with AI may be minimised (Table 8).

Similarly, the ethical principles identified in the four sources that provided detailed discussion of specific principles were extracted (Table 9), with commonalities sought as a way to understand how each framed the issues being addressed. This analysis drew on previous models of research ethics principles. In one comparison of nine international research ethics guidelines, a range of synergies were identified [2] (see Supplement 5: Mapping of Ethics Principles Across International Research Ethics Guidelines); Table 9 maps this nine, using the Australian principles, alongside a principle found in some guideline documents indicating a kind of 'long-range' outcome regarding 'societal benefits' and potential for societal-level risks beyond those to the participants directly. Thus, this framework was adopted for the identified documents, noting that such a mapping presents challenges because principles may not have equivalences, or may have one:many relationships. For example, IEEE frames Wellbeing (one of its core principles) in terms of respect for persons and human dignity, but it could additionally be framed in terms of beneficence. Moreover, as Table 10 highlights, mapping at a high level may obscure the specific focus of key principles, the weight given across these, or the ways they frame the issue.

4. Discussion

4.1. Overview

This article was introduced with a practical challenge: How should we go about developing an ethics guidance document, particularly with respect to the conduct of research using AI in the context of education?

To address this need this paper sought to identify what approaches to guideline development existed, or/and had been implicated in the development of existing guidelines (RQ1), and what the concerns of these documents were with respect to guiding ethical practice towards the application of values or principles to challenges in their particular domains (RQ2).

Our scoping review indicated that there is no well-established model for the development of ethics guidelines. Perhaps reflecting this, in the guideline documents reviewed many do not specify how they were developed, or position this concern as a site of scholarly engagement (i.e., a space for developing research evidence, and a space for drawing on such evidence). Of itself this lack of attention is surprising. Ethics guidelines *guide* much of our research practice, yet there is no prior review of these guidelines, and limited other evidence available regarding

Table 7
Foci, Audience, and Purpose of relevant openly licensed guidelines.

Guideline	Foci*	Purpose	Audience												
			Companies	Researchers	Public services	Policy makers	Civil society orgs	Consumers / public	Technologists	Educators (tech)	Ethics committees	Ethicists	Students (research)	Educators /leaders (all)	Educator-researcher
High-Level Expert Group on AI (2019, p. 6)	A	"Stakeholders committed towards achieving Trustworthy AI can voluntarily opt to use these Guidelines as a method to operationalise their commitment, in particular by using the practical assessment list of Chapter III when developing, deploying or using AI systems."	x	x	x	x	x	x							
IEEE (IEEEE et al., 2019, p. 2)	A	"provide pragmatic and directional insights and recommendations. […] Ethically Aligned Design sets forth scientific analysis and resources, high-level principles, and actionable recommendations. It offers specific guidance for standards, certification, regulation or legislation for design, manufacture, and use of A/IS that provably aligns with and improves holistic societal well-being."				x			x	x					
Turing (p.3)	A	"This document provides end-to-end guidance on how to apply principles of AI ethics and safety to the design and implementation of algorithmic systems in the public sector."				x									
AccessNow	A	"we look at the role human rights law can play in the development of artificial intelligence, including the interplay between these fundamental rights and ethics. Then, looking at widely adopted human rights instruments, we				x	x								

(*continued on next page*)

Table 7 (*continued*)

Guideline	Foci*	Purpose	Audience												
			Companies	Researchers	Public services	Policy makers	Civil society orgs	Consumers / public	Technologists	Educators (tech)	Ethics committees	Ethicists	Students (research)	Educators /leaders (all)	Educator-researcher
		highlight the ways current and foreseeable uses of artificial intelligence can interfere with a broad range of human rights. Finally, we offer a list of recommendations for stakeholders to protect those rights." (Access Now, 2018, p. 7)													
AoIR 2 (Markham and Buchanan, 2012, p. 2)	A; R	"considerations designed to support and inform those responsible for making decisions about the ethics of internet research."		x							x	x	x		
AoIR 3 (franzke et al., 2020, p. 2)		"we emphasize deliberative processes of ethical reflection. At the same time, we believe that in times of Big Data, experimental research needs to be done that requires considerations beyond informed consent, but further includes careful reflection on research design, the context of research, and the basic requirement to minimize associated risks and harms. An ongoing ethical reflection might be more helpful and beneficial in the long term for society than now restricting research."		x					x		x				
Guidelines on AI in education for educators (European Commission, 2022, p. 7)	A; E	"Support ethical use of AI in education contexts"												x	
Ethics in The Scholarship of Teaching and	E; R	Support "researchers in their design process so that their research projects will be sound		x							x				x

(*continued on next page*)

Table 7 (*continued*)

Guideline	Foci*	Purpose	Audience											
			Companies	Researchers	Public services	Policy makers	Civil society orgs	Consumers / public	Technologists	Educators (tech)	Ethics committees	Ethicists	Students (research)	Educators /leaders (all)	Educator-researcher
Learning (Fedoruk, 2017, p. 1)		and robust, and the resulting insights can inform and extend our understanding of the processes of learning and of supporting that learning with effective, evidence-based instruction"												x	
US DoE (p.5)	A; E	Addressing stakeholders "as they work together on pressing policy issues that arise as Artificial Intelligence (AI) is used in education."		x		x			x						

*Foci key: *A* = has focus on artificial intelligence or relevant technologies; *E* = has a focus on aspect of Educational research or research in education settings; *R* = provides guidance intended for research contexts.

Table 8
Mapping High-Level Distinct Challenges Addressed in the Guidelines.

Guideline (right, challenge n*)	1	2	3	4	5	**6**	7	8	9
High-Level Expert Group on AI (2019, p. 6)	x		x	x		x	x	x	
IEEE (IEEEE et al., 2019, p. 2)	x	x	x	x	x	x	x	x	x
Turing (p.3)		x	x		x		x		
AccessNow		x	x						
AoIR 2 (Markham and Buchanan, 2012, p. 2)						x			x
AoIR 3 (franzke et al., 2020, p. 2)	x	x			x			x	x
EC guidelines on AI in education for educators (European Commission, 2022, p. 7)	x	x	X	x	x	x			
Ethics in The Scholarship of Teaching and Learning (Fedoruk, 2017, p. 1)									x
US DoE				x				x	

* Challenge n mapping:

1. *Research produces both direct impact, on participants and then society, while also giving rise to indirect, long-range, and dual-use impacts*
2. *New technologies give rise to new potential for misuse*
3. *Respect for diversity, non-discrimination, and fairness – as a distinct challenge in AI research*
4. *Human control of technology and accountability for technology use*
5. *Commercial interests - while significant AI work is derived from publicly funded research, commercial actors have significant interests and this may impact relationships between funders-technology providers-researchers-public with blurred lines between these groups, and complex power dynamics*
6. *Privacy, confidentiality, data integrity and cultural norms*
7. *Respect for human-human relationships, at individual and collective levels*
8. *Effective use of AI inherently involves multiple stakeholder and disciplinary expertise, including both AI literacy and contextual awareness across cultures*
9. *Interactions and distance between researchers and participants are central to research, both when proximal, and when mediated by technologies.*

their development and use. How then should learned societies, research groups, those working on specialist sub-areas, and so on, decide whether and how to develop guidelines, and how to do so in a way that aligns to the needs of their stakeholders? Common approaches include expert consultation and drafting, but the details of these approaches, and their connection to other forms of evidence synthesis (such as reviews) and stakeholder involvement, are often unclear, and this gap is likely to hamper development of guidelines that support stakeholder learning and practice (§3.2).

Despite this lack of common development model, when excluding codes-of-conduct and similar documents, there does appear to be some consistency in guideline structures, suggesting some common needs and approaches to addressing them (§3.3). A practical limitation in some guidelines, which has implications for development of collective approaches and knowledge, is that while many guidelines provide some indication of how they can be used, most provide very little licensing information, or use restrictive licenses that would limit their uptake and integration into other resources. Where existing guidelines may be appropriate, how do we ensure that we can adapt and instantiate this

Table 9
Mapping of coverage of common research ethics principles across guidelines.

Guideline (right, overarching principle: R-Respect for Persons; B-Beneficence and non-maleficence; J-Justice; M-Merit and Integrity; L-Consideration of long-range, indirect, and dual-use impacts)	R	B	J	M	L
High-Level Expert Group on AI (2019, p. 6)	x	x	x	x	
IEEE (IEEEE et al., 2019, p. 2)	x			x	x
Turing (p.3)	x	x	x		x
EC guidelines on AI in education for educators (European Commission, 2022, p. 7)	x		x	x	x

1. High-Level Expert Group on AI (2019), (CC-By)
2. IEEE (IEEEE et al., 2019), (CC-By-NC)
3. Turing (2019), (CC-By-NC-SA)
4. EC guidelines on AI in education for educators (European Commission, 2022), (CC-By)

Table 10
Mapping Ethics Principles to Overarching Research Ethics Principles.

Doc	**Principle as stated** (right, overarching principle: R-Respect for Persons; B-Beneficence and non-maleficence; J-Justice; M-Merit and Integrity; L-Consideration of long-range, indirect, and dual-use impacts)	R	B	J	M	L
1	Respect for human dignity	x				
1	Freedom of the individual	x				
1	Respect for democracy, justice and the rule of law	x				
1	Equality, non-discrimination and solidarity	x				
1	Citizens' rights	x				
1	Respect for human autonomy	x				
1	Prevention of harm		x			
1	Fairness			x		
1	Explicability				x	
2	Respect for Human rights	x				
2	Wellbeing	x				
2	Data agency	x				
2	Effectiveness				x	
2	Transparency	x				
2	Accountability	x				
2	Awareness of misuse					x
2	Competence				x	
3	RESPECT the dignity of individual persons	x				
3	Ensure their abilities to make free and informed decisions about their own lives	x				
3	Safeguard their autonomy, their power to express themselves, and their right to be heard	x				
3	Secure their capacities to make well-considered and independent contributions to the life of the community	x				
3	Support their abilities to flourish, to fully develop themselves, and to pursue their passions and talents according to their own freely determined life plans	x				
3	CONNECT with each other sincerely, openly, and inclusively	x				
3	Safeguard the integrity of interpersonal dialogue, meaningful human connection, and social cohesion	x				
3	Prioritise diversity, participation, and inclusion at all points in the design, development, and deployment processes of AI innovation.	x				
3	Encourage all voices to be heard and all opinions to be weighed seriously and sincerely throughout the production and use lifecycle	x				
3	Use the advancement and proliferation of AI technologies to strengthen the developmentally essential relationship between interacting human beings.	x				
3	Utilise AI innovations pro-socially so as to enable bonds of interpersonal solidarity to form and individuals to be socialised and recognised by each other	x				
3	Use AI technologies to foster this capacity to connect so as to reinforce the edifice of trust, empathy, reciprocal responsibility, and mutual understanding upon which all ethically wellfounded social orders rest	x				
3	CARE for the wellbeing of each and all			x		
3	Design and deploy AI systems to foster and to cultivate the welfare of all stakeholders whose interests are affected by their use			x		
3	Do no harm with these technologies and minimise the risks of their misuse or abuse			x		
3	Prioritise the safety and the mental and physical integrity of people when scanning horizons of technological possibility and when conceiving of and deploying AI applications			x		
3	PROTECT the priorities of social values, justice, and the public interest				x	
3	Treat all individuals equally and protect social equity				x	
3	Use digital technologies as an essential support for the protection of fair and equal treatment under the law				x	
3	Prioritise social welfare, public interest, and the consideration of the social and ethical impacts of innovation in determining the legitimacy and desirability of AI technologies					x
3	Use AI to empower and to advance the interests and well-being of as many individuals as possible					x
3	Think big-picture about the wider impacts of the AI technologies you are conceiving and developing. Think about the ramifications of their effects and externalities for others around the globe, for future generations, and for the biosphere as a whole					x
4	Privacy and data governance	x				
4	Societal and environmental wellbeing					x
4	Diversity, non-discrimination, and fairness			x		
4	Transparency	x				
4	Human agency and oversight	x				
4	Technical robustness and safety				x	
4	Accountability	x				

*Mapping of principles from key documents, with rights indication

guidance for our contexts while respecting shared – and sometimes mandated – values or principles? This review draws on material available to set out the state of the field and a model approach, however further work is required to address these issues, and consider where new guidelines would be appropriate, and how they might be developed. Moreover, the material resources of ethics are significant in learning and instantiated ethical practice, yet these were largely absent from reviewed guidelines. The field of education plays an important role in treating guidelines as materials for learning regarding ethics and ethical practice, yet further work is required to evaluate guidelines in this light. Future work could investigate methods and evidence for inclusion into guidelines of materials for evidence mobilisation regarding ethical issues.

Our particular interest was in understanding how approaches and guideline models identified had been drawn on in the particular domains of AI and education research, or their combination (RQ3, §3.4). While recent reviews have indicated that a large number of guideline documents exist regarding use or development of AI, our aim in this paper was to understand how these guideline documents might in fact guide ethical action, and the underpinning approach taken in their development for this purpose. Our particular focus on education was in part due to our practical need, and in part because although significant guidance may exist at a general level or for other domains, the particular challenges of education and research in education are likely to have implications for effective guidelines.

From analysis of the returned guidelines (§3.3), despite the burgeoning number of items labelled guidelines in the AI ethics space, very few could be identified that in fact provided guidance to any stakeholder group. From close analysis of the subset of relevant and openly licensed documents discussing issues in AI or education or both, few address research ethics, and the specific concerns of use of research regarding AI in education (§3.4). While these resources did provide rich discussion of ethical issues, not all drew on established principles of research ethics which may make their adoption in that context challenging.

There is a focus on individual reflection in much of the guidance, with some noting discussion or community consultation, or (outside the research context) wider governance concerns, but surprisingly little discussion of the concrete materials of research such as consent forms. Given the general lack of guidance, and the variation in underlying principles, expression of challenges, and broader material in available guidance, it may be challenging for stakeholders to consider how emerging issues connect to prior guidance materials, or how to navigate

these issues. There is an apparent impetus for new ethical guidance for research involving AI, indeed the force of that impetus provided the practical context for this work. However, it is not always clear what the distinctive ethical features of research involving AI, in particular contexts or domains, are, and this may make it challenging to understand how existing practices and guidelines relate to any proposals. Lack of congruence between the principles put forth in the guidelines identified and established research ethics principles, alongside partial or indirect discussion of these distinctive challenges, may exacerbate this issue. In analysing the documents, a set of overarching challenges could be identified, and it may be useful in developing new guidelines to consider how to express at this relatively high-level the purported need for new guidance against the distinct challenges of the context (e.g., emerging technology) or/and domain (e.g., research in education).

4.2. Strengths and limitations

The paper sought to understand approaches taken to develop guideline documents and their structures. In doing this, this paper has synthesised a range of approaches and structures adopted, alongside a detailed mapping of the content of a subset of openly licensed guideline documents. This material is grounded in our extensive review, and there are broad applications and potential for secondary uses beyond this study across output materials including the synthesised development approach (Supplement 3: Approach for Guideline Development), guideline structure Supplement 4: Guideline Draft Template), and guideline mapping (Supplement 5: Mapping of Ethics Principles Across International Research Ethics Guidelines). These outputs are grounded in searching, data extraction, and analysis conducted by the sole author, and thus applying their interpretative lens. The use of previous analytic structures related to extracting key document information, provision of open data relating to extracts and interpretative analysis from those extracts and their charting into data matrices, is intended to increase transparency and credibility of the approach adopted.

This benefit is in part grounded in the broad scoping review approach adopted; while this broad approach presents resource constraints with respect to detailed analysis of all content returned, it has provided a clear benefit in meeting the aims of a scoping review: to *scope* the literature. The nature of any search process, is that it is often not possible to maximise recall to retrieve all relevant material. Scoping reviews respect this limitation, in being deployed to obtain the range of materials (if not every instance in that range). Thus, there may be relevant items that are excluded from this analysis, including those not available to the researcher, and non-English items. However, the data obtained is suitable to address the aim of the paper, to understand the approaches adopted across the range of ethics guidelines. Moreover, although guidelines may exist that address the concerns raised in this paper, we are neither aware of any, nor retrieved any through our search strategy, which included a number of previous reviews, which suggests that any such guidelines are not widely available. That is not to critique the guidelines reviewed in this paper; these should be treated on their own terms, with respect to the audiences and purposes they target.

Finally, the analysis approach adopted, drawn from prior research analysing guidelines as material resources, is limited in terms of scope in at least three respects. First, because the primary aim of the approach was to identify patterns of guideline development and representation (RQ1 and 2 respectively) in published works only, these findings lack detail, and their related appendices are based on an evaluative synthesis that should be independently evaluated. Second, the review approach reports only on the scope of approaches reported, but there may be other suitable approaches both for future work, and in use across studies. Finally, while the ambition of the work is to inform future guideline development, it is out of scope for this paper to make strong recommendations particularly regarding new guidelines for AI in education.

5. Conclusions

Ethics guideline documents have potential to support learning about, instantiating, and developing ethical reflection and action through consideration of ethical concepts, their application, and strategies for navigating these applications in particular domains. For them to meet this aim – as set out in our proposal for guidelines, Supplement 3: Approach for Guideline Development – guidelines should be clear:

- Who they are targeting and for what purpose, including how they relate to the existing practices and values of their target audiences, including other established ethics guidelines, such as research ethics principles,
- Why they are needed including any distinct ethical challenges faced by the target audience(s) and their context or domain
- How they might be applied including strategies for navigating ethical tensions or challenges.

Adopting shared process, and structures (Supplement 4: Guideline Draft Template) can facilitate collaborative development and adaptation of guidelines, to foster discourse regarding research ethics.

Additional information

A preprint of the manuscript is available: Knight, S. (2024, May 9). Is that a Guideline? Addressing Learning in Ethics Guidelines Through a PRISMA-ETHICS informed Scoping Review of Guidelines. https://doi.org/10.31219/osf.io/n43d6.

The Contribution Roles Taxonomy statement was generated using The Institute of Physiology CRediT generator (https://www.fgu.cas.cz/en/articles/833-credit-generator).

CRediT authorship contribution statement

Simon Knight: Writing – review & editing, Writing – original draft, Visualization, Validation, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:

Simon Knight reports a relationship with Australian Research Council that includes: funding grants. Simon Knight reports a relationship with James Martin Institute that includes: funding grants. Simon Knight reports a relationship with KTH Royal Institute of Technology that includes: funding grants. The research was funded by internal support particularly from Knight's UTS funded Professional Experience Program (PEP, or sabbatical), and undertaken while a visiting academic at the UCL Knowledge Lab, part of the Institute of Education, and the Swedish Digital Futures initiative associated with KTH. In the course of the preparation of the manuscript the author received research funding from the Australian Government through the Australian Research Council (ARC) Discovery Early Career Award (DECRA) Fellowship (DE230100065), and ARC Discovery Project (DP240100602). The views expressed herein are those of the authors and are not necessarily those of the Australian Government or Australian Research Council. If there are other authors, they declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Availability of data, code, and materials

Aspects of the data are restricted from sharing due to copyright restrictions. Where licenses permit, the compiled data is available in both

JSON form, and via a website, links available in the supplements [1].

Knight, Simon (2025). Supplements to: Understanding use of Evidence in AI Ethics Guidelines Development Through a PRISMA-ETHICS informed Scoping Review of Guidelines. figshare. Dataset. https://doi.org/10.6084/m9.figshare.25670832.

Funding

The research was funded by internal support particularly from Knight's UTS funded Professional Experience Program (PEP, or sabbatical), and undertaken while a visiting academic at the UCL Knowledge Lab, part of the Institute of Education, and the Swedish Digital Futures initiative associated with KTH.

In the course of the preparation of the manuscript the author received research funding from the Australian Government through the Australian Research Council (ARC) Discovery Early Career Award (DECRA) Fellowship (DE230100065), and ARC Discovery Project (DP240100602). The views expressed herein are those of the authors and are not necessarily those of the Australian Government or Australian Research Council.

Ethics

The manuscript does not report on personal information (derived from primary research or secondary sources). The manuscript reports on published sources, with a focus on sources published under relatively permissive (typically creative commons) licenses.

Acknowledgements

In the course of developing this review I have benefited from useful discussions with colleagues in the UCL Knowledge Lab (notably, Allison Littlejohn, Mutlu Cukurova, and Wayne Holmes), and at the Swedish Digital Futures centre (Olga Viberg, Tessy Pargman, and Cormac McGrath). At my home institution, UTS, the work has been informed by my membership of the Human Research Ethics Committee (HREC), and conversations with Nicole Vincent, Shibani Antonette, Kirsty Kitto, and Simon Buckingham Shum. I am also grateful to Mark Israel who provided useful insights in response to some earlier drafts.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.caeo.2025.100281.

References

[1] Knight, S.: Supplements to: understanding use of evidence in AI ethics guidelines development through a PRISMA-ETHICS informed scoping review of guidelines., https://doi.org/10.6084/m9.figshare.25670832, (2025). https://doi.org/10.6084/m9.figshare.25670832.

[2] te Brooks R, Riele K, Maguire M. Ethical theories, principles and guidelines. Ethics and education research. SAGE Publications Ltd; 2014. p. 18–41. https://doi.org/10.4135/9781473909762.

[3] Ada Lovelace Institute: looking before we leap expanding ethical review processes for AI and data science research, https://www.adalovelaceinstitute.org/wp-content/uploads/2022/12/Ada-Lovelace-Institute-Looking-before-we-leap-Dec-2022.pdf, (2022).

[4] Ferretti A, Ienca M, Sheehan M, Blasimme A, Dove ES, Farsides B, Friesen P, Kahn J, Karlen W, Kleist P. Ethics review of big data research: what should stay and what should be reformed? BMC Med Ethics 2021;22:1–13. https://doi.org/10.1186/s12910-021-00616-4.

[5] Hine C. Evaluating the prospects for university-based ethical governance in artificial intelligence and data-driven innovation. Res Ethics 2021;17:464–79. https://doi.org/10.1177/17470161211022790.

[6] Holmes W, Porayska-Pomsta K, Holstein K, Sutherland E, Baker T, Shum SB, Santos OC, Rodrigo MT, Cukurova M, Bittencourt II, Koedinger KR. Ethics of AI in education: towards a community-wide framework. Int J Artif Intell Educ 2021;32:504–26. https://doi.org/10.1007/s40593-021-00239-1.

[7] Knight S, Viberg O, Mavrikis M, Kovanović V, Khosravi H, Ferguson R, Corrin L, Thompson K, Major L, Lodge J, Hennessy S, Cukurova M. Emerging technologies and research ethics: developing editorial policy using a scoping review and reference panel. PLOS ONE 2024. https://doi.org/10.1371/journal.pone.0309715.

[8] Díaz-Campo, J., Segado-Boj, F.: Ethical guidelines in education & educational research journals indexed in the WoS /Indicaciones éticas en las revistas de educación indexadas en la WoS. Profesional de la información. 25, 738–46 (2016). https://doi.org/10.3145/epi.2016.sep.04.

[9] Knight S, McGrath C, Viberg O, Pargman TC. Learning about AI ethics from cases: a scoping review of AI incident repositories and cases. AI Ethics 2025. https://doi.org/10.21203/rs.3.rs-4844649/v1.

[10] Fjeld, J., Achten, N., Hilligoss, H., Nagy, A., Srikumar, M.: Principled artificial intelligence: mapping consensus in ethical and rights-based approaches to principles for AI, https://papers.ssrn.com/abstract=3518482, (2020). https://doi.org/10.2139/ssrn.3518482.

[11] Jobin A, Ienca M, Vayena E. The global landscape of AI ethics guidelines. Nat Mach Intell 2019;1:389–99. https://doi.org/10.1038/s42256-019-0088-2.

[12] Khan AA, Badshah S, Liang P, Waseem M, Khan B, Ahmad A, Fahmideh M, Niazi M, Akbar MA. Ethics of AI: a systematic literature review of principles and challenges. In: The International Conference on Evaluation and Assessment in Software Engineering 2022. Gothenburg Sweden: ACM; 2022. p. 383–92. https://doi.org/10.1145/3530019.3531329.

[13] Schiff D, Borenstein J, Biddle J, Laas K. AI ethics in the public, private, and NGO sectors: a review of a global document collection. IEEE Trans Technol Soc 2021;2:31–42. https://doi.org/10.1109/TTS.2021.3052127.

[14] Antoniou, J., Ryan, M., Christodoulou, E., Iordanou, K.: D5.6 AI in Education report, https://figshare.dmu.ac.uk/articles/online_resource/D5_6_AI_in_Education_Report/16912318, (2021). https://doi.org/10.21253/DMU.16912318.

[15] Brey, P., Lundgren, B., Macnish, K., Ryan, M.: Shaping the ethical dimensions of smart information systems– a European perspective (SHERPA) Guidelines for the ethical use of AI and big data systems, https://www.project-sherpa.eu/wp-content/uploads/2019/12/use-final.pdf, (2020). https://doi.org/10.21253/DMU.12301331.v1.

[16] Brey, P., Lundgren, B., Macnish, K., Ryan, M.: Guidelines for the ethical development of AI and big data systems: an ethics by design approach, https://www.project-sherpa.eu/wp-content/uploads/2019/12/development-final.pdf, (2020). https://doi.org/10.21253/DMU.12301322.v1.

[17] Brey, P., Lundgren, B., Macnish, K., Ryan, M., Andreou, A., Brooks, L., T. Jiya, Klar, R., Lanzareth, D., Maas, J., Oluoch, I., Stahl, B.: D3.2 Guidelines for the development and the use of SIS, https://figshare.dmu.ac.uk/articles/online_resource/D3_2_Guidelines_for_the_development_and_the_use_of_SIS/11316833, (2021). https://doi.org/10.21253/DMU.11316833.

[18] Jansen, P., Henschke, A., Erden, Y., Marchiori, S., Brey, P., Hoefsloot, Marit: D5.7 ethics by design and Research Ethics for AI, https://figshare.dmu.ac.uk/articles/online_resource/D5_7_Ethics_by_Design_and_Research_Ethics_for_AI/16912345, (2021). https://doi.org/10.21253/DMU.16912345.

[19] Ryan, M., Brey, P., Macnish, K., T. Hatzakis, King, O., Maas, J., Haasjes, R., Fernandez, A., Martorana, S., Oluoch, I., Eren, S., Puil, R.V.D.: D1.4 Report on ethical tensions and social impacts, https://figshare.dmu.ac.uk/articles/online_resource/D1_4_Report_on_Ethical_Tensions_and_Social_Impacts/8397134, (2021). https://doi.org/10.21253/DMU.8397134.

[20] S., Bernd, A., Josephina, B., Nitika, B., Laurence, J., Philip, L., Blerta, K., Alexey, M., Samuel, R., Rowena, S., Nicole, W., Zuzanna, Wright, David: D5.8 Artificial Intelligence Impact Assessment - a systematic review, https://figshare.dmu.ac.uk/articles/online_resource/D5_8_Artificial_Intelligence_Impact_Assessment_-_A_Systematic_Review/16912387, (2021). https://doi.org/10.21253/DMU.16912387.

[21] Brey P, Jansen P, Maas J, Lundgren B, Resseguier A. SIENNA D4.7: an ethical framework for the development and use of AI and robotics technologies. Zenodo 2021. https://doi.org/10.5281/zenodo.7266848.

[22] Jansen, P., Brey, P., Fox, A., Maas, J., Hillas, B., Wagner, N., Smith, P., Oluoch, I., Lamers, L., Gein, H., Resseguier, A., Rodrigues, R., Wright, D., Douglas, D.: SIENNA D4.4: ethical analysis of AI and robotics technologies. (2020). https://doi.org/10.5281/zenodo.4068083.

[23] Resseguier, A., Rodrigues, R., Santiago, N.: Ethics as attention to context: recommendations for AI Ethics annex to D5.4: multi-stakeholder strategy and tools for ethical AI and robotics, https://www.sienna-project.eu/digitalAssets/915/c_915542-l_1-k_ethics-as-attention_sienna_jan-2021.pdf, (2021).

[24] Tambornino, L., Lanzerath, D., Rodrigues, R., Wright, D.: SIENNA D4.3: survey of REC approaches and codes for Artificial Intelligence & robotics. (2019). https://doi.org/10.5281/zenodo.4067990.

[25] Wong RY, Madaio MA, Merrill N. Seeing like a toolkit: how toolkits envision the work of AI ethics. Proc ACM Hum-Comput Interact 2023;7:1–27. https://doi.org/10.1145/3579621.

[26] Jordan, S.R.: Designing an artificial intelligence research review committee, (2019).

[27] Israel M. Regulating ethics. Research ethics and integrity for social scientists: beyond regulatory compliance. SAGE publications Ltd, 1 Oliver's yard, 55 city road, London EC1Y 1SP United Kingdom. 2015. https://doi.org/10.4135/9781473910096.

[28] Office for Human Research Protections (OHRP). Belmont report: ethical principles and guidelines for the protection of human subjects of research. 1978. https://www.hhs.gov/ohrp/regulations-and-policy/belmont-report/read-the-belmont-report/index.html.

[29] Blackman R. Why you need an AI ethics committee. 2022. https://hbr.org/2022/07/why-you-need-an-ai-ethics-committee.

[30] Hutson M. Who should stop unethical A.I.?. 2021. https://www.newyorker.com/tech/annals-of-technology/who-should-stop-unethical-ai.

[31] Leetaru, K.: Are research ethics obsolete in the era of big data?, https://www.forbes.com/sites/kalevleetaru/2016/06/17/are-research-ethics-obsolete-in-the-era-of-big-data/, last accessed 2023/01/10.
[32] Leetaru, K.: AI "Gaydar" and how the future of ai will be exempt from ethical review, https://www.forbes.com/sites/kalevleetaru/2017/09/16/ai-gaydar-and-how-the-future-of-ai-will-be-exempt-from-ethical-review/, last accessed 2023/01/10.
[33] Guillemin M, Gillam L, Rosenthal D, Bolitho A. Human research ethics committees: examining their roles and practices. J Empiric Res Hum Res Ethics 2012;7:38–49. https://doi.org/10.1525/jer.2012.7.3.38.
[34] ACM: ACM Code of Ethics and Professional Conduct, https://www.acm.org/binaries/content/assets/about/acm-code-of-ethics-and-professional-conduct.pdf, (2018).
[35] IEEEE, Chatila R, Havens JC. The IEEE Global Initiative on Ethics of Autonomous and Intelligent Systems. E. In: Aldinhas Ferreira MI, Silva Sequeira J, Singh Virk G, Tokhi MO, Kadar E, editors. Robotics and well-being. Cham: Springer International Publishing; 2019. p. 11–6. https://doi.org/10.1007/978-3-030-12524-0_2.
[36] Hagendorff T. The Ethics of AI ethics: an evaluation of guidelines. Minds Mach 2020;30:99–120. https://doi.org/10.1007/s11023-020-09517-8.
[37] McNamara A, Smith J, Murphy-Hill E. Does ACM's code of ethics change ethical decision making in software development?. In: Proceedings of the 2018 26th ACM Joint Meeting on European Software Engineering Conference and Symposium on the Foundations of Software Engineering. New York, NY, USA: Association for Computing Machinery; 2018. p. 729–33. https://doi.org/10.1145/3236024.3264833.
[38] Cuellar M-F, Larsen B, Lee YS, Webb M. Does information about AI regulation change manager evaluation of ethical concerns and intent to adopt AI? J Law Econ Organ 2022. https://doi.org/10.1093/jleo/ewac004.
[39] Miller, C., Coldicutt, R.: People, power and technology: the tech workers' view, https://doteveryone.org.uk/report/workersview/, (2019).
[40] Knight, S., Shibani, A., Vincent, N.: Ethical AI governance: mapping a research ecosystem. AI and ethics. (2024). https://doi.org/10.1007/s43681-023-00416-z.
[41] Samuel G, Derrick G, van Leeuwen T. The ethics ecosystem: personal ethics, network governance and regulating actors governing the use of social Media research data. Minerva 2019;57:317–43. https://doi.org/10.1007/s11024-019-09368-3.
[42] Clark K, Duckham M, Guillemin M, Hunter A, McVernon J, O'Keefe C, Pitkin C, Prawer S, Sinnott R, Warr D, Waycott J. Advancing the ethical use of digital data in human research: challenges and strategies to promote ethical practice. Ethics Inf Technol 2019;21:59–73. https://doi.org/10.1007/s10676-018-9490-4.
[43] EU RRI Toolkit project: RRI Toolkit, https://rri-tools.eu/search-engine, last accessed 2023/04/01.
[44] Evans N, van Hoof M, Inguaggiato G, Marušić A, Gordijn B, Dierickx K, van Zeggeren D, Dunnik H, Gesinn A, Bouter L, Widdershoven G. The Embassy of Good Science - a community driven initiative to promote ethics and integrity in research. Open Res Europe 2022;2. https://doi.org/10.12688/openreseurope.14422.1.
[45] Tolich M, Tumilty E. Making ethics review a learning institution: the Ethics Application Repository proof of concept – tear.Otago.Ac.nz. Qual Res 2014;14:201–12. https://doi.org/10.1177/1468794112468476.
[46] Tumilty E, Tolich M, Dobson S. Rupturing Ethics literacy: the Ethics application repository (TEAR). In: van den Hoonaard WC, Hamilton A, editors. The ethics rupture: exploring alternatives to formal research-ethics review. Toronto, CANADA: University of Toronto Press; 2016.
[47] Kitto K, Knight S. Practical ethics for building learning analytics. Br J Educ Technol 2019;50:2855–70. https://doi.org/10.1111/bjet.12868.
[48] Knight S, Shibani A, Buckingham Shum S. A reflective design case of practical ethics in learning analytics. Br J Educ Technol 2023;54:1837–57. https://doi.org/10.1111/bjet.13323.
[49] Goodyear-Smith F, Jackson C, Greenhalgh T. Co-design and implementation research: challenges and solutions for ethics committees. BMC Med Ethics 2015;16:1–5. https://doi.org/10.1186/s12910-015-0072-2.
[50] Klingler, C., Mertz, M.: REIGN framework - use of research evidence to inform guidance regarding normative-ethical topics. (2021). https://doi.org/10.13140/RG.2.2.21248.76808.
[51] Davis M. Eighteen rules for writing a code of professional ethics. SCI ENG ETHICS 2007;13:171–89. https://doi.org/10.1007/s11948-007-9000-2.
[52] Guidance for writing a code of ethics, http://ethicsweb.ca/codes/coe3.htm, last accessed 2023/03/01.
[53] Messikomer CM, Cirka CC. Constructing a code of ethics: an experiential case of a national professional organization. J Bus Ethics 2010;95:55–71. https://doi.org/10.1007/s10551-009-0347-y.
[54] Wilford, S., Timmermans, J., Grimpe, B., Jirotka, M.: Governance for responsible innovation GREAT, https://www.great-project.eu/Deliverables16, (2016).
[55] Kokkinaki, N.: Code building, https://prores-project.eu/tool-no-8/, last accessed 2023/03/11.
[56] Ess, C., AoIR ethics working committee: ethical decision-making and internet research recommendations from the aoir ethics working committee, https://aoir.org/reports/ethics.pdf, (2002).
[57] Peters MDJ, Marnie C, Tricco AC, Pollock D, Munn Z, Alexander L, McInerney P, Godfrey CM, Khalil H. Updated methodological guidance for the conduct of scoping reviews. JBI Evid Implement 2021;19:3. https://doi.org/10.1097/XEB.0000000000000277.
[58] Peters MDJ, Godfrey C, McInerney P, Khalil H, Larsen P, Marnie C, Pollock D, Tricco AC, Munn Z. Best practice guidance and reporting items for the development of scoping review protocols. JBI Evid Synth 2022;20:953. https://doi.org/10.11124/JBIES-21-00242.
[59] Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, Moher D, Peters MDJ, Horsley T, Weeks L, Hempel S, Akl EA, Chang C, McGowan J, Stewart L, Hartling L, Aldcroft A, Wilson MG, Garritty C, Lewin S, Godfrey CM, Macdonald MT, Langlois EV, Soares-Weiser K, Moriarty J, Clifford T, Tunçalp Ö, Straus SE. PRISMA extension for scoping reviews (PRISMA-ScR): checklist and explanation. Ann Intern Med 2018;169:467–73. https://doi.org/10.7326/M18-0850.
[60] Gentles SJ, Charles C, Nicholas DB, Ploeg J, McKibbon KA. Reviewing the research methods literature: principles and strategies illustrated by a systematic overview of sampling in qualitative research. Syst Rev 2016;5:172. https://doi.org/10.1186/s13643-016-0343-0.
[61] Kahrass, H., Borry, P., Gastmans, C., Ives, J., Graaf, R., Strech, D., Mertz, M.: PRISMA-Ethics – Reporting Guideline for Systematic Reviews on Ethics Literature: development, explanations and examples, h.t.t.ps://osf.io/g5kfb/, (2021). https://doi.org/10.31219/osf.io/g5kfb.
[62] Mertz M, Kahrass H, Strech D. Current state of ethics literature synthesis: a systematic review of reviews. BMC Med 2016;14:152. https://doi.org/10.1186/s12916-016-0688-1.
[63] Mertz M. How to tackle the conundrum of quality appraisal in systematic reviews of normative literature/information?. Analysing the problems of three possible strategies (translation of a German paper) BMC Med Ethics 2019;20:81. https://doi.org/10.1186/s12910-019-0423-5.
[64] Akkerman S, Bakker A. Boundary crossing and Boundary objects. Rev Educ Res 2011;81:132–69. https://doi.org/10.3102/0034654311404435.
[65] Wasey, J.: PRISMAstatement, https://github.com/jackwasey/PRISMAstatement, (2022).
[66] Center for History and New Media: Zotero Quick Start Guide, http://zotero.org/support/quick_start_guide.
[67] Nadin S, Cassell C. Using data matrices. Essential guide to qualitative methods in organizational research. SAGE Publications Ltd, 1 Oliver's Yard, 55 City Road, London EC1Y 1SP United Kingdom; 2004. p. 271–87. https://doi.org/10.4135/9781446280119.n22.
[68] Miles MB, Huberman AM. Qualitative data analysis: an expanded sourcebook. 2nd ed. Thousand Oaks, CA, US: Sage Publications, Inc; 1994.
[69] Yadav D. Criteria for good qualitative research: a comprehensive review. Asia-Pac Edu Res 2022;31:679–89. https://doi.org/10.1007/s40299-021-00619-0.
[70] High-Level E. Group on A.I.: Ethics guidelines for trustworthy AI | shaping Europe's digital future, https://digital-strategy.ec.europa.eu/en/library/ethics-guidelines-trustworthy-ai, (2019).
[71] Microsoft. Responsible bots: 10 guidelines for developers of conversational AI. 2018. https://www.microsoft.com/en-us/research/uploads/prod/2018/11/Bot_Guidelines_Nov_2018.pdf.
[72] The Conference toward AI Network Society: draft AI R&D GUIDELINES for international discussions, https://www.soumu.go.jp/main_content/000507517.pdf, (2017).