# Report and Recommendations
# 'Alice'
# Ethical Considerations for AI in Education

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What ethical or social issues are important for this project?
What professional, legal or design standards might the organisation need to read and implement?
What can YOU suggest as KEY actions to take to ensure that this project is successful?

# Contents

# 1   Introduction

This report comprises ethical considerations and analysis concerning technology, data privacy, disinformation, and accessibility.

The resulting recommendations for deployment aim to inform, such that TechSoft be fully cognisant of challenges faced by an AI chatbot in education. South Star Academy's proposed student support services chatbot 'Alice' will require thoughtful diligence before it can be deemed production-ready.

# 2   Relevant Codes of Practice

Professional codes of conduct provide software engineers with an ethical starting point for a deployment of this nature. Given the bandwidth of this topic, and the scope of this report, exhaustive coverage of the full documentation is impossible, so key characteristics of differing guidelines will be the primary focal point. The BCS focusses on professionals; the IEEE standardises the technological aspects; the ACM is more concerned with societal impact.

## 2.1   BCS Code of Conduct

BCS members must demonstrate "due regard for public health, privacy, security and wellbeing of others and the environment" *(British Computer Society 2024, p. 2)*, particularly salient considering Alice will be handling sensitive student data and potentially influencing student wellbeing.

The BCS also mandates professionals to only provide service "within [their] professional competence" *(British Computer Society 2024, p. 2)* which begs the question: where exists the limit of Alice's 'competence' in the context of student support? Is a system's competency assumed to be an extension of the professionals who calibrated it?

Members are additionally required to "uphold the reputation of the profession" *(British Computer Society 2024, p. 3)*. This translates to full transparency regarding Alice's management and capabilities. Safeguards must also be in place to prevent misuse in order to preserve public trust of AI systems in education, let alone the trust of students.

## 2.2   IEEE Code of Ethics

Data retention and deletion policies must be established and clear, ensuring a commitment to "protection of... personal information and data" *(Institute of Electrical and Electronics Engineers 2024, p. 1)*, and a commitment to student privacy. Engineers must identify and eliminate potential bias from the model and algorithms in use, such that Alice "not discriminate against any person because of characteristics protected by law" *(Institute of Electrical and Electronics Engineers 2024, p. 1)*. This should be verified and assured with rigorous testing and regular audits, ensuring commitment to "honest and realistic... claims or estimates based on available data" *(Institute of Electrical and Electronics Engineers 2024, p. 2)*, coupled with an established mechanism for human oversight and intervention when Alice's confidence in a response is low.

## 2.3   ACM Code of Ethics

The ACM Code proposes that "all people are stakeholders in computing" *(Association for Computing Machinery 2024, p. 1)*, alluding that the enhancement of student wellbeing and academic success is not merely a nice gesture, but necessary for the betterment of society, assuming compliant (and considerate) execution.

Alice should be constructed with accessibility in mind, "[fostering] fair participation of all people, including those of underrepresented groups" *(Association for Computing Machinery 2024, p. 2)*.

**Caveats to Information Processing**

Blundell argues that "such codes are seldom consulted and often incorporate bland (and sometimes contradictory) statements intended to satisfy a broad range of stakeholders" *(Blundell 2020, p. 40)* and professionals must practise discernment and maintain awareness for the consequences of poor decision-making, both quantitatively and in qualitative aspects. Underpinning deontological ethics is the notion that the professional is duty-bound to rely on their better judgement where universally established rules fail. This remains one of Kant's core philosophical tenets, to "respect the reason in you".

BCS specifies duty to "due... diligence in accordance with the Relevant Authority's requirements whilst exercising... professional judgement at all times" *(British Computer Society 2024, p. 2)*. In our context: information relating to the endangerment of any student(s) would likely take precedent over privacy, as is established protocol *In Loco Parentis*. This should be at the discretion of human moderators by way of a sophisticated content-flagging system and anonymity secured by multiple key-holders to ensure consensus for de-anonymisation. Students may be more comfortable anonymously, so this process of de-anonymising must be abuse-proof to ensure trust remains strong. All decision-making processes must prioritise students foremost, with the necessary privacy precautions in place to protect student data alongside regular monitoring of the chatbot's holistic impact on the educational environment.

# 3    Further Considerations

## A Note on Regulatory Standards

In-depth representation for truly ethical and compliant practice are appended in Appendix B (relevant definitions with respect to implications for Alice), and not the main body of this report, for brevity's sake.

## 3.1    Data Ethics

Any implementation of 'Alice' would raise significant privacy concerns regarding the collection, storage, and use of student data *(Annus 2023, pp. 366-370)*. Since proper compliance is in the best interest of student wellbeing and vice versa, all-encompassing singular actions, policies, and processes have the potential to satisfy all stakeholders simultaneously.

### 3.1.1    GDPR/Regulatory Compliance

From design through to deployment continously for any collection of data, as well as full transparency in its use of data, and clarity regarding what it is collecting data to be used for, TechSoft must define the nature of its policies, processes, and practice. It is also imperative that TechSoft safeguard against any third-parties from gaining access to data with security best practices. Schools are in position to safeguard student data, appreciating this perspective is essential for TechSoft engineers. For more information, see Appendix B. Additionally, record a Data Protection Impact Assessment (DPIA) (template provided in Appendix A).

### 3.1.2    Data Governance and Security

Privacy by design as an ethos enabling strong governance and security measures including:

#### Authentication and Authorisation

OAuth 2.0 and OpenID Connect for Single Sign-On (SSO) and Role-Based Access Control (RBAC) for fine-tuning permissions *(Josuttis 2023, pp. 80-120)*.

#### Data Encryption

Robust data encryption methods *(Stallings 2023, pp. 100-150)*, AES-256 for data at rest and TLS 1.3 for data in transit.

### 3.1.3    Data Anonymisation

K-anonymity can be employed for protecting student identities *(El Emam and Arbuckle 2023, pp. 75-100)*, and the implementation of differential privacy for aggregate data analysis, anonymising students entirely into statistics beneficial for upgrading and improving the chatbot, and alleviating the burden of at-risk data unnecessary for development purposes.

### 3.1.4    Data Minimisation

Data collected must be absolutely necessary and audited regularly to ensure all stored information is still relevant *(Article 29 Working Party 2018)*.

#### Privacy-Preserving UX Patterns

Implementing privacy-preserving UX patterns *(Hartzog 2023, pp. 50-100)* includes:

- Making privacy settings easily accessible and understandable

- Ensuring data usage transparency in the user interface

#### Informed Consent

Information about data usage must be clear, with opt-in mechanisms for non-essential features. Age-appropriate consent must be obtained from students (parental consent for students under the age of 13 *(Federal Trade Commission 2023)*).

## 3.2    Algorithmic Ethics

Explicit labelling of 'Alice' as an AI system *(Institute of Electrical and Electronics Engineers 2023)*, including information on the capabilities and management of the chatbot itself. Elucidation of empirical evidence rooting from the consequences of algorithmic configuration can benefit not only developers, but users, and by extension society en masse.

### 3.2.1    AI Ethics Principles

Adhering to established AI ethics principles *(European Commission 2024)* is essential:

- Human agency and oversight

- Technical robustness and safety

- Privacy and data governance

- Transparency

- Diversity, non-discrimination, and fairness

- Societal and environmental well-being

- Accountability

### 3.2.2   Transparency

Implementing explainable AI techniques to interpret chatbot decisions *(Arrieta et al. 2022, pp. 82-115)* is recommended:

- Use of interpretable machine learning models

- Providing rationale for chatbot recommendations and actions

### 3.2.3   Bias Testing

Mitigating bias in the chatbot's algorithms is essential for equitable student support: Regular testing for biases in chatbot responses *(Association for Computing Machinery Conference on Fairness, Accountability, and Transparency 2024)* should include:

- Employing automated bias detection tools

- Implementing human-in-the-loop evaluation for sensitive topics

### 3.2.4   Fairness-Aware Machine Learning

Implementing fairness-aware machine learning techniques *(Barocas, Hardt, and Narayanan 2021)* is crucial:

- Utilising algorithmic fairness metrics (e.g., demographic parity, equal opportunity)

- Applying bias mitigation strategies in model training and deployment

### Ethical Review Process

Implementing an ethical review process *(Floridi and Cowls 2023)* includes:

- Periodic assessments of chatbot decisions for bias

- Alignment checks with established ethical guidelines

### 3.2.5   Diverse Training Data

Using diverse training data to prevent demographic biases *(Mehrabi et al. 2023, pp. 1-35)* involves:

- Including diverse student profiles in training datasets

- Regularly updating data to reflect changing student demographics

### 3.2.6   Regular Audits

Conducting regular audits of the chatbot's decision-making processes *(AI Ethics Guidelines for Education 2024)* is essential:

- Logging and analysis of chatbot interactions

- Third-party audits to ensure adherence to ethical guidelines

## 3.3   User Experience and Accessibility

### 3.3.1   User-Centred Design

Implementing a design process focussed on student needs:

### 3.3.2   Accessibility Standards

Ensuring the chatbot is usable by all students:

### 3.3.3   Web Content Accessibility Guidelines (WCAG) 2.2

Adhering to WCAG 2.2 *(World Wide Web Consortium 2023)* includes:

- Ensuring content is perceivable, operable, understandable, and robust

- Implementing keyboard accessibility and enough time for user interactions

### Cognitive Accessibility Considerations

Addressing cognitive accessibility *(Yesilada, Brajnik, and Harper 2023, pp. 1-10)* includes:

- Using clear and simple language

- Implementing consistent layout and interaction patterns

### Inclusive Design

Addressing diverse student needs:

### Adaptable User Interface

Creating an adaptable user interface *(Harper and Yesilada 2024, pp. 20-50)* includes:

- Offering customisable font sizes and colour contrasts

- Supporting different input methods (text, voice, gestures)

**Neurodiversity Considerations**

Addressing neurodiversity *(Armstrong 2023, pp. 30-60)* involves:

- Providing options to reduce visual clutter

- Offering alternative formats for information presentation (text, audio, visual)

**Touch-Friendly Interfaces**

Designing touch-friendly interfaces *(Hoober and Berkman 2023, pp. 80-120)* involves:

- Using appropriately sized touch targets

- Implementing gesture-based interactions where appropriate

### 3.3.4   Conversational Design

Creating natural and effective chatbot interactions:

**Tone and Personality**

Establishing tone and personality *(Bradbury 2024, pp. 20-50)* involves:

- Maintaining a consistent voice aligned with educational context

- Using age-appropriate language and responses

**Vulnerability Management**

Managing vulnerabilities *(Stuttard and Pinto 2023, pp. 150-200)* includes:

- Conducting regular automated vulnerability scans

- Implementing penetration testing of IT systems

### 3.3.5   User Research Methodologies

Conducting user research *(Goodman, Kuniavsky, and Moed 2023, pp. 50-100)* involves:

- Utilising contextual inquiry to understand student support scenarios

- Developing personas representing diverse student populations

**Iterative Design Process**

Implementing an iterative design process *(Holtzblatt and Beyer 2024, pp. 30-60)* includes:

- Using rapid prototyping with tools like Figma or Sketch

- Conducting usability testing with representative student groups

### 3.3.6   User Feedback Integration

Incorporating student and staff input:

**Feedback Collection Methods**

Implementing feedback collection methods *(Tullis and Albert 2024, pp. 100-50)* involves:

- Providing in-chat feedback options

- Conducting periodic user surveys

**In-App Feedback Mechanisms**

Implementing in-app feedback mechanisms *(Tullis and Albert 2024, pp. 100-150)* involves:

- Providing short surveys after chatbot interactions

- Offering easy-to-use bug reporting tools

## 3.4   Ethical Design Patterns

### 3.4.1   Dark Pattern Avoidance

Avoiding dark patterns *(Brignull 2023)* includes:

- Providing transparent information about chatbot capabilities

- Offering clear opt-out options for data collection

### 3.4.2   Attention Economy Awareness

Addressing attention economy concerns *(Williams 2024, pp. 10-30)* involves:

- Designing for focussed, purposeful interactions

- Avoiding addictive design patterns

### 3.4.3   Psychological Impact

The potential psychological effects of AI-based support on students must be carefully considered:

**Avoiding Over-Reliance**

Mitigating the risk of over-reliance on AI for emotional support *(Miner et al. 2022, p. 746)* involves:

- Clearly communicating AI's role as a supplement, not replacement, for human support

- Integrating the chatbot with pre-existing human counselling services and enabling direct connections to appropriate resources and non-AI support

**Safeguards Against Harmful Responses**

Implementing safeguards against harmful or inappropriate chatbot responses *(Bickmore et al. 2021, p. e11510)* includes:

- Developing content filtering and trigger warning systems

- Establishing escalation protocols for crisis situations

**Clear Boundaries**

Setting clear boundaries between AI support and human intervention *(American Psychological Association 2024)* requires:

- Defining thresholds for transitioning from AI to human support

- Training staff on effectively working alongside AI systems

### 3.4.4 Ethical Framework and Governance

Establishing a robust ethical framework is crucial for the responsible development and deployment of 'Alice':

**Ethics Review Board**

Forming an ethics review board *(United Nations Educational, Scientific and Cultural Organization 2023)* should involve:

- Ensuring multi-stakeholder representation (educators, students, ethicists, technologists)

- Conducting regular reviews of chatbot performance and ethical implications

## 3.5 Monitoring, Evaluation, and Continuous Improvement

### 3.5.1 AI and Machine Learning Architecture

**Algorithm Selection**

Applying machine learning algorithms *(Géron 2024, pp. 25-50)* includes:

- Rely upon supervised learning and human-in-the-loop models for classification tasks (e.g., identifying at-risk students). "Human-centric AI" is a key principle.

- Implementing reinforcement learning for adaptive responses

**Natural Language Processing (NLP) Frameworks**

Implementing NLP frameworks *(Jurafsky and Martin 2024, pp. 1-15)* involves:

- Utilising BERT or GPT-based models for understanding context and intent, allowing for the provision of specified and bespoke services.

- Custom training on domain-specific data for career advice, mental health support, and academic guidance.

### 3.5.2 Conversational Metrics

Measuring conversational metrics *(Quarteroni et al. 2024, pp. 1-32)* includes:

- Assessing response accuracy and relevance

- Tracking task completion rates

**Telemetry Systems**

Setting up telemetry systems *(Vadapalli 2023, pp. 30-60)* includes:

- Implementing real-time data collection on user interactions

- Ensuring privacy-preserving logging mechanisms

### 3.5.3 Usage Analytics

Implementing usage analytics *(Beasley 2023, pp. 50-100)* includes:

- Tracking common queries and pain points

- Analysing conversation flows and completion rates

**Sentiment Analysis**

Performing sentiment analysis *(Liu 2023, pp. 50-100)* includes:

- Analysing emotional tone of student interactions
  (N.B. It is worth noting that certain interpretations of EU legislation suggest that AI systems capable of deciphering emotions may be inherently considered unethical. However, given the rapid pace of technological innovation, particularly in the AI sector, it is plausible that the European Parliament may adopt a nuanced approach, interpreting the law's intent rather than adhering strictly to its literal wording) *(Dignum 2023, pp. 150-175)*

- Identifying potentially distressed students

### 3.5.4 Continuous Learning and Adaptation

**Human-in-the-Loop Dialogue Optimisation**

Optimising dialogues *(Gao, Galley, and Li 2023, pp. 50-100)* involves:

- Refining conversation flows based on user feedback

- Dynamically adjusting response strategies

Conducting human-in-the-loop evaluation *(Vaughan 2024, pp. 30-60)* involves:

- Regular audits of chatbot conversations by education experts

- Crowdsourced evaluations for diverse perspectives

**Research Collaboration**

Fostering research collaboration *(Dillenbourg 2023, pp. 50-100)* involves:

- Establishing partnerships with universities for cutting-edge research

- Publishing findings to contribute to the broader field

# 4 Reflection and Recommendations

Key recommendations for the 'Alice' project:

- Establish a robust ethical framework and governance structure. Data security and data governance is of paramount importance.

- Implement state-of-the-art AI and machine learning technologies with a focus on inclusive outputs, free from negative bias.

- Train and prepare staff to work effectively alongside AI systems, not in lieu of them.

- Prioritise students, cater to diverse student needs.

- Develop comprehensive monitoring and evaluation systems for continuous improvement

- Ensure continued compliance with legislature.

# A    Appendix A: Data Protection Impact Assessment Template

[Include a template or example of a Data Protection Impact Assessment (DPIA) tailored for the 'Alice' chatbot project]

# B    Appendix B: Regulatory Standards

## DATA PROTECTION LEGISLATION

### General Data Protection Regulation (GDPR)

"

- Establishing a lawful basis for processing: Consent or legitimate interests

- Implementing data subject rights: Access, rectification, erasure, portability

- Appointing a Data Protection Officer (DPO)

"

*(European Union 2016)*

### UK Data Protection Act 2018

"

- Adhering to specific provisions for processing personal data in educational contexts

- Implementing safeguards for processing special category data (e.g., health information)

"

*(UK Government 2018)*:

### Children's Online Privacy Protection Act (COPPA)

"

- Obtaining parental consent for students under 13

- Implementing limited data collection and retention policies

"

*(Federal Trade Commission 2023)*

## EDUCATION SECTOR REGULATIONS

### Education and Skills Act 2008

"

- Fulfilling the duty to promote the well-being of students

- Implementing safeguarding responsibilities in digital environments

"

*(UK Government 2008)*

### Keeping Children Safe in Education

"

- Implementing online safety measures for educational technology

- Providing staff training on digital safeguarding

"

*(Department for Education 2024a)*

**Special Educational Needs and Disability (SEND) Code of Practice**

"

- Ensuring accessibility requirements for digital learning tools are met

- Considering personalised support for students with SEND

"

*(Department for Education 2024b)*

# PROFESSIONAL STANDARDS AND GUIDELINES

**BCS Code of Conduct**

"

- Considering public interest in development decisions

- Maintaining professional competence and integrity

- Fulfilling duty to relevant authorities

"

*(British Computer Society 2024, pp. 1-5)*

**ACM Code of Ethics and Professional Conduct**

"

- Contributing to society and human well-being

- Avoiding harm in system design and implementation

- Maintaining honesty and trustworthiness

"

*(Association for Computing Machinery 2024, pp. 1-4)*

**IEEE Ethically Aligned Design**

"

- Preserving human rights in AI systems

- Ensuring transparency and accountability in AI decision-making

- Implementing privacy-by-design principles

"

*(Institute of Electrical and Electronics Engineers 2024, pp. 2-5)*

# INDUSTRY-SPECIFIC STANDARDS

**ISO/IEC 27001:2022**

"

- Conducting risk assessment and management

- Implementing information security controls

- Establishing continuous improvement processes

"

*(International Organization for Standardization 2022)*

**Learning Tools Interoperability (LTI) Standards**

"

- Ensuring secure integration with existing learning management systems

- Enabling data portability and interoperability

"

*(IMS Global Learning Consortium 2024)*

**Web Content Accessibility Guidelines (WCAG) 2.2**

"

- Ensuring the chatbot interface is perceivable, operable, understandable, and robust

- Maintaining compatibility with assistive technologies

"

*(World Wide Web Consortium 2023)*

# ETHICAL AI FRAMEWORKS

**UNESCO Recommendation on the Ethics of Artificial Intelligence**

"

- Protecting human rights and fundamental freedoms

- Promoting diversity and inclusiveness in AI systems

- Ensuring transparency and explainability of AI decisions

"

*(UNESCO 2021)*

**OECD AI Principles**

"

- Ensuring AI benefits people and the planet

- Designing AI systems that respect the rule of law, human rights, democratic values, and diversity

"

*(Organisation for Economic Co-operation and Development 2023)*

**EU Ethics Guidelines for Trustworthy AI**

"

- Implementing human agency and oversight in AI systems

- Ensuring technical robustness and safety

- Maintaining privacy and data governance

"

*(European Commission 2024)*

## CONTINUOUS COMPLIANCE/ONGOING AUDITING IN PERPETUITY

**Regular Compliance Audits**

"

- Performing annual data protection audits

- Engaging third-party security assessments

"

*(Information Commissioner's Office 2024)*

**Ethics Review Board Oversight**

"

- Conducting periodic reviews of chatbot decisions and outcomes

- Establishing stakeholder feedback mechanisms

"

*(AI Ethics Board Best Practices 2024)*

**Continuous Professional Development**

"

- Providing regular training on evolving legal and ethical standards

- Obtaining certification in AI ethics for key personnel

"

*(Chartered Institute of Personnel and Development 2024)*

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