SCIENCE FICTION AS A MEDIUM FOR ADRESSING ETHICAL QUESTIONS IN SCIENCE AND TECHNOLOGY

HS102 TERM PAPER

Qualitative Research by

Divyam Khandelwal (202452316) and Darshi Doshi (202452317)

Dr Barnali Chetia

April 2, 2025

ACKNOWLEDGEMENT

I extend my heartfelt thanks to Professor Barnali Chetia for her invaluable guidance and support throughout my study on “Science fiction as a medium for addressing ethical questions in science and technology.” Her expertise and encouragement were instrumental in shaping the direction and quality of our research.

I am also grateful to Ms. Dharti Sharma and Ms. Jinal Purohit, our teaching assistants, for their assistance and insights during this project. Their dedication and willingness to share their knowledge greatly contributed to its success.

A big thank you goes to the 87 respondents who generously participated in the survey. Their contributions provided essential primary data without which this study would not have been possible.

I want to acknowledge the unwavering support of my friends and colleagues, whose encouragement and ideas enriched my understanding and analysis throughout the research process.

Lastly, I express my gratitude to all the researchers, academics, and writers whose work served as inspiration and foundation for our study. Their contributions have paved the way for further exploration and understanding in the field.

Thank you to everyone involved for helping make this research endeavour a success.

DECLARATION

We, Divyam Khandelwal and Darshi Doshi, affirm that the research paper titled " Science fiction as a medium for addressing ethical questions in science and technology" submitted for the HS102 End-of-Semester Project under the guidance of Professor Barnali Chetia, is our original work. We conducted extensive study, analysis, and documentation to thoroughly investigate the subject. We assure the accurate attribution and citation of all data sources used in this research. Every effort has been made to ensure the reliability and correctness of the data presented. Any references, quotations, or citations from other sources are properly referenced. We acknowledge the guidance and assistance provided by Professor Dr. Barnali Chetia, which greatly enhanced our understanding and presentation of the study's topic. We also appreciate the helpful comments and constructive criticism from our classmates and colleagues during the project. By signing below, we confirm the truthfulness and originality of our work and declare that all data presented in this research paper is accurate to the best of our knowledge.

Divyam Khandelwal (202452316)

Darshi Doshi (202452317)

CONTENTS

Contents

INTRODUCTION

1.1 BACKGROUND

In the last few decades, exponential developments in technologies have had very profound effects across many spheres of life, from artificial intelligence, genetic technology, to autonomous systems. Technology holds potential to shape individuals' lives but with serious ethical issues as well. For example, as computers become more sophisticated, who would be responsible if they behave in a harmful manner? Should people play around with genes and where do they draw the line in gene control? With technology changing at such a rapid pace, the ethical frameworks under which they are regulated somehow fall behind or appear to be lacking.

Science and technology students' ethics training usually covers conventional methods. Students study traditional moral theories such as utilitarianism (concern for the greatest good of the greatest

number), deontology (ethics of duty), and virtue ethics (character and virtues). These theories are basics, but they tend not to give scientists and engineers good advice on how to resolve the hard, real-life problems they will face. In addition, most science and engineering ethics courses are based on abstract, theoretical thinking that may have nothing to do with the actual problems students will eventually have to deal with.

It is here that science fiction enters as a strong friend. Science fiction provides us with a way of thinking about possible or hypothetical situations where ethical concerns are actual and immediate. In contrast to mainstream theoretical ethics, science fiction makes them real. Science fiction brings ethics closer and makes them more applicable by placing them in engaging narratives. One can approach complex questions via the lives of characters, who are being presented with decisions that are similar to the type of decisions that we may find ourselves having to make in life—decisions that are multidimensional and in certain situations fraught with consequences.

One such example is Ken Liu's short fiction work Mono No Aware (2012), which illustrates the way in which a character, Hiroto, is confronted with the dilemma of survival for the individual versus survival for humanity during a global disaster. The ethical decision that he must make—to rescue himself or the common good—is what will be debated for hours in an ethics seminar, but with Liu's book, one is experiencing it both emotionally and on a personal level. The End of Mr. Y by Scarlett Thomas (2006) similarly addresses ethical challenges regarding animal research. The central character, Ariel, is faced with

scientific responsibility challenges and challenges of treating research animals. Such stories bring ethics alive and make ethical considerations an imperative.

Science fiction is particularly powerful in addressing these issues because it allows for the exploration of hypothetical scenarios. For instance, Carl Djerassi's Cantor's Dilemma (1989) explores the pressures of academic research, highlighting issues of integrity, peer review, and the competition for grants and recognition. Meanwhile, Andromeda Romano-Lax's Plum Rains (2018) questions how artificial intelligence in caregiving might impact human relationships, raising ethical questions about the role of technology in personal care.

These stories, and innumerable others, demonstrate that science fiction is not just an entertainment category—it's a tool that starts a conversation about the ethical implications of science and technology in a compelling, accessible, and thought-provoking way.

1.2 PROBLEMS AND IMPORTANCE OF RESEARCH

While ethics is typically included in most science and engineering curricula, it is not always taught in a way that allows students to best understand its importance. Most technical programs focus on the instruction of knowledge and skills such as coding, designing, and building new technologies. They do not spend enough time teaching the ethical implications of these advancements. This creates a serious

knowledge deficit—students are computer-literate upon graduation but can be unclear about how to approach the ethical dilemmas they will face in their career. With technology evolving at a pace so rapid that it's hard to keep up with, ethical considerations are more pertinent than ever before, and unless trained, professionals can make decisions that have drastic consequences for people and society in general.

One of the biggest problems with ethics being taught is that it is far too theoretical. Most ethics classes spend a lot of time on abstract philosophical maxims like "the greatest good for the greatest number" (utilitarianism) or "following a strict moral code" (deontology). As useful as these maxims are, they can feel distant and unconnected to the real problems of science and technology. A number of students struggle with translating these theories into the kinds of decisions they will be faced with professionally. They then view ethics as nothing more than another subject that they have to study, rather than a valuable instrument of thoughtful and responsible decision-making.

The other issue is that students often do not recognize ethics as an imperative. Most people think that ethical choices are simply a matter of personal belief and that the most important thing is to learn technical skills. In engineering, artificial intelligence, and genetic studies, students are usually encouraged to concentrate on innovation and problem-solving instead of asking themselves if something should be developed. Due to this, they might not be serious about ethics discussions or be inclined to participate in them. Some even feel that ethical issues need to be addressed by policymakers or philosophers and not scientists and engineers. But in practice, ethical decision-

making needs to be a core part of the activity of any scientist or engineer.

It is also difficult for students to appreciate the long-term implications of their actions. Some technological advancements look good in the short term but have unforeseen consequences later, years or even decades later. For example, at first social media platforms were considered a way of people getting connected; however, with time, issues such as data privacy violation, disinformation, and negative mental health effects have arisen as top ethical concerns. Genetic engineering and artificial intelligence have good prospects but raise some basic issues of privacy, equity, and human rights. As these repercussions do not make themselves immediately evident, students may have no notion that the ethical challenges their project may generate later are not evident to them at the moment.

This is where science fiction enters. Rather than teaching ethics as a collection of abstract concepts, science fiction inserts ethical dilemmas into compelling stories, which students can more readily understand and apply. Science fiction makes ethical discussions more interesting and stimulating by presenting them through characters and storylines in a way that is real, even if the worlds are not. For instance, artificial intelligence stories can pose questions regarding free will, accountability, and justice, while genetic engineering stories can bring to the fore issues of human identity and inequality. By engaging students in these scenarios, science fiction makes ethical discussions more interesting and stimulating.

This study will discuss how science fiction can be utilized as a useful instrument to enhance ethics education in science and technology courses. Through the ability to relate ethical problems on an emotional level, science fiction can foster deeper thinking and more informed decision-making. Rather than memorizing theories, students can learn about ethical problems through storytelling, and thus the learning process becomes more effective and powerful.

1.3 RESEARCH OBJECTIVES

The aim of this research is to examine how science fiction can be applied to the education of ethics in science and technology. Ethics classes are boring or too abstract for most students, but science fiction makes ethics interesting and more accessible. This study will answer the following four primary questions:

How does science fiction simplify ethical questions?

Ethics could be problematic or abstract concepts out of people's day-to-day experiences, yet science fiction demystifies them by translating them into an interesting story. Unlike simply studying theories of ethics out of textbooks, students are actually able to witness them functioning inside imaginary universes through character and situation contexts in which they have some grasp or familiarity.

Can science fiction make students more interested in ethics?

Most students learning science and technology view ethics as an afterthought—something secondary to their core subjects. This study will examine if science fiction can revise that notion. If the students get attached to the stories, they might also begin to care about the ethical questions underlying them.

Does science fiction make students think more intensely about ethics in various areas?

Ethical dilemmas in fields like engineering, artificial intelligence, and genetics can be difficult to fully grasp. This study will explore whether science fiction helps students reflect more deeply on these challenges and consider the potential consequences of scientific advancements.

What is the best way to use science fiction in ethics education?

Lastly, this study will examine how science fiction can be incorporated into ethics classes in the best possible manner. What types of narratives are most effective? Do students need to read novels, view films, or discuss short stories? The aim is to discover the optimal method for making ethics instruction interesting, stimulating, and relevant.

By providing the answers to these questions, this study seeks to demonstrate that science fiction is not only a means of entertainment but also an effective tool for educating students about the ethical challenges that they might eventually encounter in their profession.

1.4 HYPOTHESIS

The research hypothesis here is that science fiction is a good vehicle for investigating moral questions in science and technology so that they are made more accessible and interesting than through conventional approaches. Science fiction works because it:

1. Employing storytelling on an affective level to make ethical decisions personal and meaningful.

2. Creates hypothetical situations where students are able to question consequences without actual risk.

3. Reduces complex technologies and ethical concerns to brief stories.

4. Discusses over one ethical view by illustrating diverse views through characters and storylines.

Through this analysis, this research aims to show that science fiction is not just entertainment but a powerful learning tool that can provide prospective scientists and engineers with the ethical challenges they will face in their careers.

LITERATURE REVIEW

2.1 SCIENCE FICTION IN ETHICS EDUCATION: CURRENT RESEARCH

Science fiction is increasingly being used as a teaching tool in ethics, particularly in computer science, engineering, and artificial intelligence. A major reason for this is that science fiction enables students to access ethical questions in more intuitive ways than abstract philosophical abstractions. Over the past few years, several studies have examined the usefulness of employing sci-fi for the education of ethics, and numerous ones have concluded that it offers an exciting method to present difficult moral issues.

Adding to this pedagogical structure is an anthology of stories by prominent contemporary writers, such as Ken Liu, T.C. Boyle, and Rebecca Roanhorse. Each story is accompanied by "Story Frames," which include introductory background and reflection questions that are specifically tied to ethical frameworks. These Story Frames fill the gap between theory and narrative, leading students to critically examine ethical issues in the fictional contexts and transfer their understanding to real-life situations. The design and use of the anthology are discussed in an interview on AIhub, "Computing and Technology Ethics: Engaging Through Science Fiction – an Interview with the Authors," which highlights its utility as a practical and creative

teaching tool. This instrument not only validates the findings of the study but also presents a replicable model for including science fiction within ethics courses.

Burton et al. (2018) in How to Teach Computer Ethics through Science Fiction believe that science fiction narratives enable students to approach ethical matters more comfortably than abstract theory. Their research showed that students preferred to understand sophisticated ethical concepts better when they were framed within the context of sci-fi. Sci-fi places the ethical problems within familiar, fanciful scenarios so that moral issues become more tangible, and therefore, students are able to explore them without any actual risks.

One of the dramatic aspects of the methodology of Burton et al. (2023) is its degree of reliance on decontextualization against political bias. By ensuring ethical discussion is spared from being overwhelmed by present-day political biases, such a methodology promotes an integrative and aseptic atmosphere of learning wherein minds can concentrate on pure abstractions of ethics instead of controverted topics.Decontextualization is achieved by naturally integrating ethics into technical computer science courses through close collaboration with the faculty in philosophy. Such cross-disciplinary initiatives make sure that ethical issues are not dealt with as marginal but are integrated within the mainstream curriculum, complementing students' technical education with sound ethical foundations.

The integration of Burton et al.'s (2023) work

and the anthology featured offers valuable depth to consideration of student interest in ethics education. Applying the narrative interest of science fiction, this approach inspires higher levels of attention to ethical considerations within computer science while captivating student interest. These initiatives present a contemporary vision for pedagogical innovation, with relevance to steering the future direction of curriculum development in the field. This addition enhances the literature review by highlighting an innovative method that combines technical training with ethical awareness, as a reaction to the evolving demands of computer science education.

Likewise, Summet and Bates (2020), in their ASEE PEER publication Science Fiction as an Entry Point for Ethical Frameworks in Engineering and Computer Science Education, describe how narrative scenarios involving AI caretakers can be examined with the help of ethical theories such as Utilitarianism, Kantianism, and Virtue Ethics. These ethical models are usually hard for students to comprehend in the abstract, but with sci-fi, students can apply these theories to real-world situations, which makes them more comprehensible. They discovered that employing sci-fi narratives as an educational tool allows students to exercise ethical decision-making in a risk-free environment prior to encountering actual challenges in their professional lives.

In Computing and Technology Ethics: Engaging through Science Fiction (2023), Burton and others amplify these concepts, demonstrating how science fiction by authors such as Ken Liu and Ted Chiang can depict ethical dilemmas in technology. Science fiction, this book contends, can make ethics more accessible to technical students who have difficulty

with abstract ethical concepts. Rather than simply studying ethical concepts, students are encouraged to live through ethical challenges through characters with whom they can identify, thus making these principles more accessible.

In 2022, Johnson discovered that students who learned ethics using science fiction had better reasoning skills. When comparing traditional case studies to lessons based on sci-fi, Johnson's research indicated that students who learned using sci-fi were more adept at determining parties affected, thinking about long-term effects, and applying ethical theory to actual technology problems. These results indicate that science fiction not only assists students in learning ethics—it also makes them better critical thinkers.

2.2 ANALYSIS OF KEY SCIENCE FICTION WORKS

This part discusses some of the most important science fiction works that address ethics in various ways. These works are especially effective in teaching ethics since they present real-life examples of moral issues that can be analyzed and thought about by students.

2.2.1 Individual vs. Collective Good: "Mono No Aware" by Ken Liu

Ken Liu's short story Mono No Aware (2012) is a gripping analysis of utilitarian ethics in the circumstance of survival in space. The protagonist, Hiroto, must make a decision between sacrificing his own life for the greater good of humans, or saving his own life. This is a choice rendered even more tragic in the context of Japanese

philosophy of mono no aware, a philosophy that mourns the beauty and fleeting nature of life. In the book, Hiroto is presented with a difficult choice: he can either save humanity, or he can keep living his own life in a world that is already close to extinction. This ethical dilemma gives students a real emotional stake in the concept of utilitarianism—sacrificing for the greater good.

Through positioning the ethical inquiry within the fabric of a human drama, Liu successfully emotionally identifies with the student throughout the process of decision making. This is science fiction's greatest strength: ethics theory gets tangible real-world credence and is not some distant, fanciful abstraction. In the drama presented, the student comes to appreciate that true ethics dilemmas do indeed make difficult choices out of which private sacrifice must be undergone.

2.2.2 Research Ethics and Integrity: "Cantor's Dilemma" by Carl Djerassi

Carl Djerassi's novel Cantor's Dilemma (1989) delves into the ethical challenges researchers face in the scientific community. The story follows two researchers, Cantor and Stafford, who are trying to publish their findings on a potential cancer cure. The problem arises when their calculations are based on unproven theories, which raises the question of scientific integrity. Stafford is more interested in publishing the findings to acquire fame, while Cantor requires honesty and proof before making assertions.

The ethical conflict in the story arises due to the "publish or perish" culture of academia, in which researchers will feel compelled to sacrifice their ethics in order to be successful. This is an extremely valid issue in the scientific community, and Cantor's Dilemma shows how slight ethical missteps in research can have enormous repercussions. The novel is a valuable teaching aid because it addresses ethical concerns that are applicable to students who are considering careers in research. It learns the value of honesty, integrity, and the damage that can be done by taking shortcuts in scientific endeavors.

2.2.3 Animal Experimentation Ethics: "The End of Mr. Y" by Scarlett Thomas

In The End of Mr. Y (2006), Scarlett Thomas explores animal experimentation ethics in a subplot about rescuing test mice in lab experiments. The protagonist's decision to rescue the animals acts as an introduction to discussing more extended ethical issues in science, like the trade-off between bettering scientific knowledge and treating animals fairly. Thomas interlaces these ethical issues into a larger framework of issues related to consciousness, reality, and metaphysics and the way ethical issues in science will tend to arise alongside other domains of investigation.

By putting the ethical challenge of animal rights into a philosophical perspective, Thomas shows that not all ethical decisions are as cut and dry. Students can understand this story because it shows how personal and moral dilemmas occur in scientific experimentation, particularly on living things. This story challenges students to reflect on the ethics of

experimenting with animals and what responsibility the scientist has towards his subjects.

2.2.4 AI Ethics in Caregiving: "Plum Rains" by Andromeda Romano-Lax

In Plum Rains (2018), Andromeda Romano-Lax explores the role of artificial intelligence as a caretaker. The novel takes place in a future Japan, where elderly woman Sayako has both a human caretaker, Angelica, and a robotic caretaker, Hiro. The relationship between characters is complex: Angelica dislikes the robot because she thinks it might take her job away from her, while Sayako grows close to Hiro, the AI caretaker.

This story makes students question the ethics of the application of AI to caregiving, such as implications on human relationships, AI displacing workers, and emotional ramifications of turning to machines for friendship. Plum Rains encourages students to explore how society is being changed by AI and the ethics of when individuals interact with robots and machines. It's a great demonstration of how science fiction can cause us to think about the future of technology from a human viewpoint.

2.2.5 Feminism and Gender Ethics in Science Fiction

Science fiction has also been a field for feminist consideration and gender ethics for decades now, resisting universal presumptions regarding power, identity, and equality. To cite just one, Margaret Atwood's The Handmaid's Tale (1985) describes a future society in which women have lost all their rights and are only mere reproductive

machines. This bleak picture of gender oppression raises serious questions of morality with regard to autonomy, reproductive freedom, and the roles of women in society.

Ursula K. Le Guin's The Left Hand of Darkness (1969) also explores gender roles, presenting a society where the inhabitants are gender-neutral. By challenging traditional gender roles, these stories help students think critically about gender inequality in the real world, particularly in STEM fields, where women often face discrimination.

2.3 ANALYSIS OF SCIENCE FICTION MOVIES

2.3.1 Artificial Intelligence: Black Mirror

The anthology show Black Mirror offers varying visions of how AI may remake our lives. In Be Right Back, a woman brings back her dead boyfriend using AI, but comes to the realization that no machine is capable of substitution for human beings. The episode raises ethical questions over whether AI can ever reproduce human emotions. Metalhead, however, presents us with a nightmare world where automated dogs chase down humans, warning us of the risks of self-sustaining AI. The series forces us to consider how much authority we should entrust to technology before it takes control of us.

2.3.2 AI and Gender: *Ex Machina*

Ex Machina (2014) delves into AI and gender roles by telling the tale of Ava, a robot programmed to think like a human. She is highly advanced but controlled and objectified by her male programmer. The movie is based on real-world concerns regarding how women tend to be treated in technology and society. More significantly, it asks the question: if AI gets self-aware, should it be granted rights? Ex Machina challenges us to look at the ethics of developing intelligent beings who could eventually require freedom.

2.3.3 Genetic Modification: Gattaca

In Gattaca (1997), genetic modification decides an individual's destiny. The "perfect" genes receive the best professions, while natural-born individuals are discriminated against. The main character, Vincent, rebels against this system and shows that human potential is not contained in DNA. The movie cautions us against the threat of genetic discrimination and asks us if genetic modification should be utilized to mold society. Should science determine who succeeds and who fails? Gattaca reminds us that technology must serve humanity, not tear it apart.

2.3.4 Women's Rights in a Dystopian World: Mad Max: Fury Road

Mad Max: Fury Road (2015) is an action blockbuster, sure, but one that also paints a powerful feminist picture. Amidst a backdrop where women are owned as possessions, Furiosa battles to release captive

women and restore their agency. The film is a critical commentary on patriarchal oppression with themes of survival and resistance at its core. Aside from the explosions and car chases, Mad Max: Fury Road is a tale of empowerment and the struggle for freedom in a world that attempts to control women's bodies.

RESEARCH METHODOLOGY

Research methodology is the backbone of any academic research, providing a systematic approach to gathering and analyzing data in the quest to answer particular research questions. In this research, which investigates science fiction as a vehicle for exploring ethical issues in science and technology, a qualitative research methodology is used. This method suits the subject quite well, since it allows in-depth investigation into narrative texts and the complex moral issues they embody. The methodology covers a number of steps that include choosing relevant science fiction novels engaging with science and technology ethics questions, applying tried ethical frameworks in the analysis of the narratives, investigating how aspects of the narratives play their parts in ethics, and determining reception outside of science fiction and science and technology policy studies. All this ensures there is an investigation that is robust and deep, not missing the nuances.

3.1 RESEARCH DESIGN

This study follows a qualitative research approach, focusing on literary analysis to examine how science fiction narratives address ethical issues. Additionally, a survey was conducted to gather public opinions on the effectiveness of science fiction as a tool for ethical discussions. By analyzing selected novels, stories, already published surveys and case studies and our own survey responses, the research explores how science fiction serves as a pedagogical tool for teaching ethics, responsibility, and societal values.

3.2 DATA COLLECTION

The primary method of data collection involves a detailed analysis of literary texts, movies, relevant scholarly sources, already published case studies and surveys and our own survey responses. The study selects novels and short stories that address specific ethical dilemmas, including:

- **"Mono No Aware" by Ken Liu** – Individual vs. Collective Benefit
- **"Cantor's Dilemma" by Carl Djerassi** – Research Ethics and Integrity
- **"The End of Mr. Y" by Scarlett Thomas** – Animal Experimentation Ethics
- **"Plum Rains" by Andromeda Romano-Lax** – AI Ethics in Caregiving
- **Feminist and Gender Ethics in Science Fiction** – Including *The Handmaid's Tale* by Margaret Atwood and *The Left Hand of Darkness* by Ursula K. Le Guin

Data is gathered from literary texts, academic papers, ethical theory discussions, and survey results to explore how these works contribute to ethical education.

3.3 CASE STUDIES

3.3.1

What They Did

A university class utilized science fiction narratives to educate students regarding computer ethics.

They matched sci-fi readings with ethical principles such as utilitarianism, deontology, and virtue ethics.

Students analyzed ethical issues in the narratives and how these apply to everyday scenarios.

3.3.2

What They Did

Engineering students read Michael Crichton's "Prey", a science fiction book on nanotechnology and AI.

Following reading, students wrote about what they learned and how it relates to their career.

3.3.3

What They Did

Students examined tales of AI caretakers (robots caring for humans).

They debated ethical theories such as Utilitarianism (maximum good for most people), Kantianism (moral obligation), and Virtue Ethics (individual character).

The aim was to determine whether sci-fi makes students more aware of actual AI ethics issues.

3.3.4

What They Did

Students were divided into two groups:

One group was taught ethics through classic real-world case studies.

The other group was taught ethics through science fiction tales.

They were assessed on their capacity to

Identify who is impacted in an ethical dilemma.

Make predictions about long-term effects of ethical decisions.

Use ethical theories to apply to real-world technology problems.

3.4 FILMS CONCLUSION

All of these movies take a difficult ethical question and make it intimate, and we are forced to think about the world we are building. Black Mirror warns us of the dangers of AI replacing actual human connections and dictating our lives. Ex Machina forces us to ask whether AI, if it becomes self-aware, deserves rights and how gender affects how AI is made. Gattaca makes us think about the risks of genetic engineering and whether science gets to determine human value. Mad Max: Fury Road teaches us that the struggle for equality of the sexes is continued and that oppression still takes many forms.

Science fiction isn't all about make-believe worlds—it's about us. It makes us think about where we're going and whether we are doing the right thing to create a better world.

3.5 SURVEY METHODOLOGY

A survey was conducted to collect opinions on the role of science fiction in discussing ethical issues. The survey targeted a diverse group of participants, including students, educators, and general readers. Key aspects of the survey included:

- Participants' familiarity with science fiction.
- Their perspectives on how sci-fi influences ethical thinking.
- Opinions on whether sci-fi narratives enhance moral reasoning.

The survey responses were analyzed to identify trends in how different demographics perceive the impact of science fiction on ethical education.

1. What is your age group? *

- ○ Under 18
- ◉ 18-20
- ○ 21-23
- ○ 24 or above

2. How familiar are you with science fiction? *

- ◉ Very familiar (I frequently watch/read sci-fi)
- ○ Somewhat familiar (I occasionally watch/read sci-fi)
- ○ Not familiar (I rarely or never watch/read sci-fi)

3. How often do you engage with science fiction (books, movies, TV shows, games, etc.)? *

- ◉ Very Frequently (Daily/Weekly)
- ○ Frequently (Monthly)
- ○ Occasionally (A few times a year)

3. How often do you engage with science fiction (books, movies, TV shows, games, etc.)? *

- (●) Very Frequently (Daily/Weekly)
- ( ) Frequently (Monthly)
- ( ) Occasionally (A few times a year)
- ( ) Rarely
- ( ) Never

4. To what extent do you believe science fiction explores ethical dilemmas related to science and technology? *

- ( ) Significantly
- ( ) Moderately
- ( ) Slightly
- ( ) Not at all
- ( ) I'm not sure

5. Which of these problems, often shown in science fiction, do you think are important for us today? (Check all that apply) *

- [ ] Artificial Intelligence and its impact on humanity
- [ ] Genetic engineering and human enhancement
- [ ] Space exploration and colonization ethics
- [ ] Cybersecurity and data privacy
- [ ] The impact of technology on social structures and equality
- [ ] Environmental consequences of technological advancement
- [ ] Other: _____

6. Do you think science fiction can change how people talk and make rules about new science and technology? *

- ◯ Yes, a lot
- ◯ Yes, a little
- ◯ Not really
- ◯ Not at all
- ◯ I don't know

7. Science fiction stories are too extreme and don't help us with real-life problems. Do you agree? *

- ◯ Yes, I strongly agree
- ◯ Yes, I agree
- ◯ I'm not sure
- ◯ No, I disagree
- ◯ No, I strongly disagree

7. Science fiction often shows bad futures. Do you think this is mostly to warn us, or does it just make us scared of new technology? *

- ◯ Mostly to warn us
- ◯ Mostly makes us scared
- ◯ A bit of both
- ◯ Neither
- ◯ I don't know

8. Do you think "what if" stories in science fiction are more helpful than true stories when thinking about the right and wrong of new technology? *

- ◯ Much more helpful
- ◯ A bit more helpful
- ◯ Equally helpful
- ◯ A bit less helpful
- ◯ Much less helpful

9. Do you think the fun parts of science fiction stop people from thinking about the serious messages?

- ◯ Yes, often
- ◯ Sometimes
- ◯ Rarely
- ◯ Never
- ◯ I don't know

10. Should ethics be considered when developing new technologies? *

- ◯ Yes, always
- ◯ Yes, but only in certain cases
- ◯ No, scientific progress should not be limited by ethics
- ◯ Not sure

11. Do you think governments and scientists should take inspiration from science fiction when making ethical decisions? *

- ◯ Yes
- ◯ No
- ◯ Maybe
- ◯ Not sure

12. How often do you discuss ethical concerns about science and technology with your peers? *

- ◯ Frequently
- ◯ Occasionally
- ◯ Rarely
- ◯ Never

13. What role should science fiction play in education about ethics in science and technology? *

- ◯ It should be a core part of discussions in schools/universities
- ◯ It should be used as a supplementary tool for ethical discussions
- ◯ It has no real value in education
- ◯ Not sure

RESULTS

4.1 CASE STUDY RESULTS

4.1.1

Results & Impact

Students learned about ethics more effectively when tied to science fiction.

They demonstrated enhanced critical thinking and improved ethical decision-making.

One student stated, "I now have the tools to talk about ethical topics in technology."

Effect:

The research indicated that fiction makes ethical problems more tangible and enables students to implement ethical thinking in actual scenarios.

4.1.2

Results & Impact

Students gained better ethical understanding of risks in technology.

They understood that scientists should consider the future consequences of new technology.

The research revealed that role-playing scenarios enable students to construct moral reasoning within a low-risk setting.

Influence:

Applying fiction in engineering ethics enabled the students to look beyond technical capability and think about the ethical implications of their work.

4.1.3

Results & Impact

Students found ethical dilemmas related to AI more significant when investigated through narratives.They improved at identifying ethical issues and making ethical arguments.

Most reported that they now consider the ethical implications of AI in real life, not merely its technical capabilities.

Impact:

This research confirmed that narratives about AI make students understand ethics more effectively than dry theoretical arguments.

4.1.4

Results & Impact

The sci-fi group did better across the board.

Sci-fi students demonstrated greater ethical thinking and participated more actively in discussions.

Sci-fi made ethics tangible and emotionally resonant, whereas standard case studies seemed too abstract.

Impact:

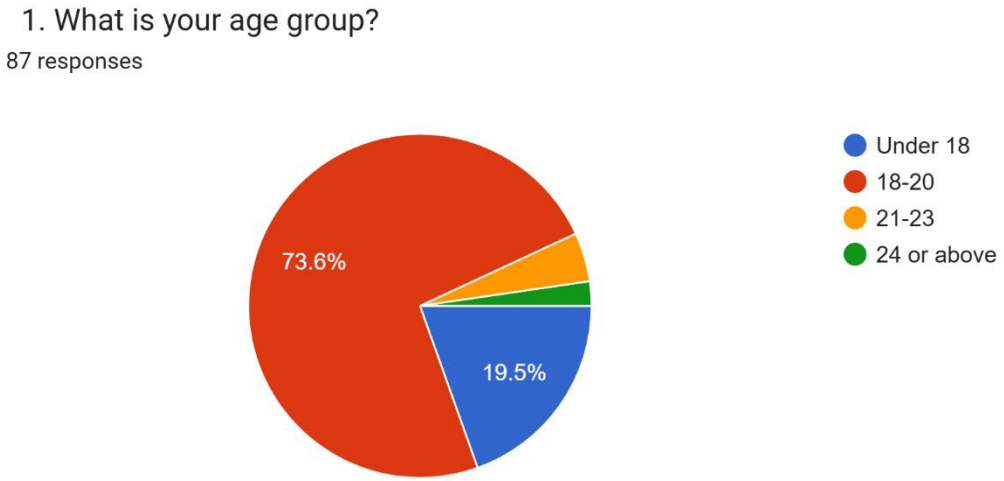
This research demonstrated that sci-fi is not merely entertainment—it actually enhances ethical education better than conventional approaches.

4.2 SURVEY RESULTS

The survey we conducted lead to the following results:-

4.2.1 KEY FINDINGS

AGE GROUP



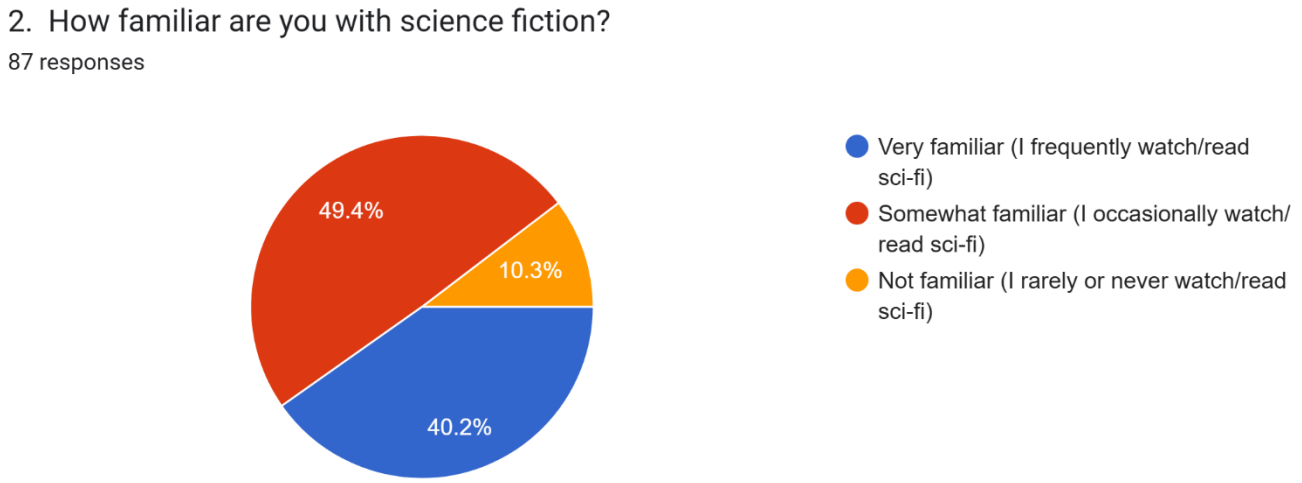
Most respondents are under 18 which is about 73.8%

19% of the respondents are between 18-20

7.2% of the respondents are 21 or above

This shows the dominance of under-18 respondents suggests findings reflect youth perspectives, who may engage with sci-fi differently (e.g., via films/games vs. literature).

FAMILIARITY WITH SCIENCE FICTION



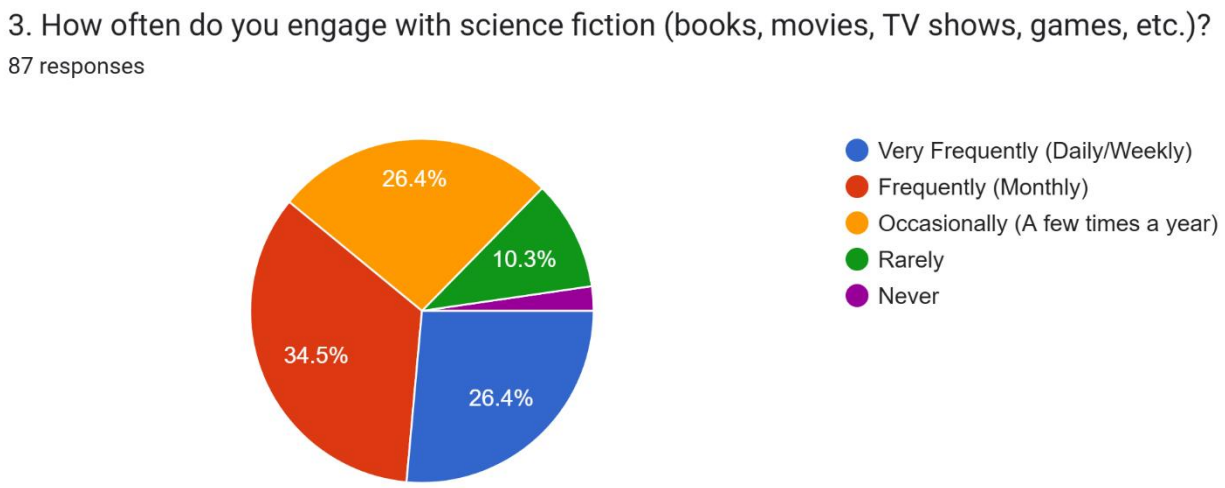
Most of the people are somewhat familiar with science fiction which makes upto 49.4%.

About 40.2% of the people make very familiar with sci-fi and watch it on a regular basis.

Only a 10% of people are unfamiliar with what sci-fi is

This shows that in todays times sci-fi is extremely popular and is most people can relate with it.

HOW OFTEN DO THEY ENGAGE WITH SCIENCE FICTION



- 34.5% responded "Frequently (Monthly)"
- 26.4% responded "Very Frequently (Daily/Weekly)"
- 26.4% responded "Occasionally (A few times a year)"
- 10.3% responded "Rarely"
- A very small percentage responded "Never" (appears to be around 2.4%)

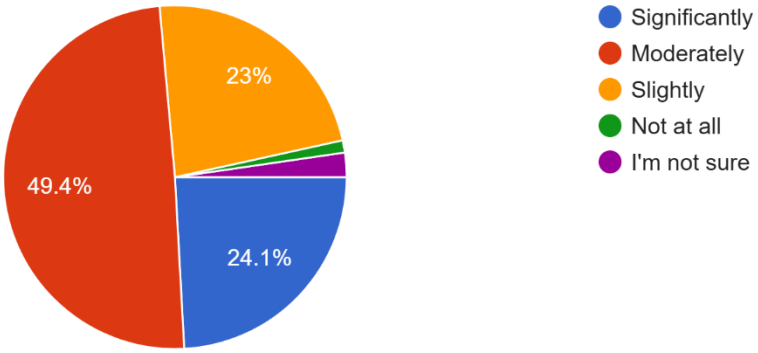
The data shows that the majority of respondents (60.9%) engage with science fiction at least monthly, with over a quarter engaging daily or weekly. Regular science fiction consumers (those who engage at least occasionally) make up approximately 87.3% of respondents, while only about 12.7% rarely or never engage with the genre.

This show how popular sci-fi actually is.

HOW EFFECTIVE IS SCIENCE FICTION TO EXPLORE ETHICAL DILEMMAS

4. To what extent do you believe science fiction explores ethical dilemmas related to science and technology?

87 responses

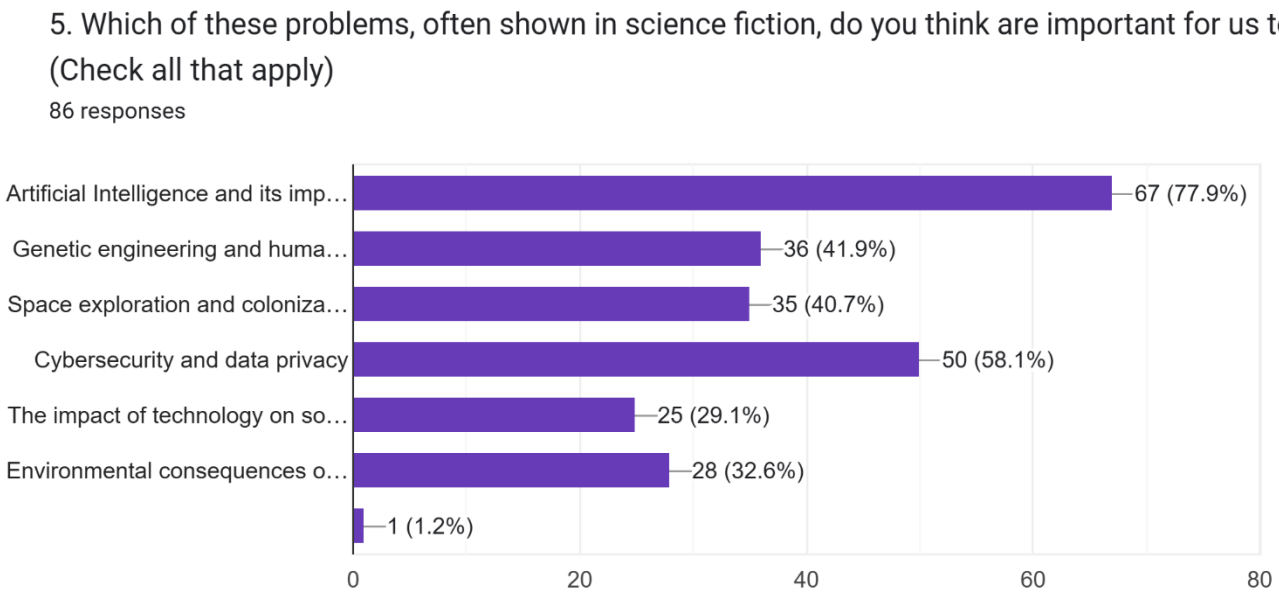


- The combined percentage of respondents who believe science fiction explores ethical dilemmas either "Significantly" or "Moderately" is 73.5% (24.1% + 49.4%)
- Only about 3.5% of respondents selected either "Not at all" or "I'm not sure" combined
- The ratio of "Moderately" to "Significantly" responses is approximately 2:1
- The ratio of "Moderately" to "Slightly" responses is approximately 2.15:1
- The total number of responses (87) suggests this is likely from a focused study rather than a large-scale survey

- The overwhelming majority (96.5%) acknowledge at least some relationship between science fiction and ethical exploration of science and technology

This data could be used to support an argument that there is strong consensus among the surveyed population that science fiction serves as a medium for ethical exploration, with disagreement primarily about the extent rather than the existence of this relationship.

HOW RELATIVE ARE SCIENCE FICTION AND REAL WORLD



The survey results show a clear hierarchy of concerns about science fiction themes that respondents consider relevant to contemporary issues:

1. **Artificial Intelligence and its implications** dominates with 67 respondents (77.9%) identifying it as important. This

overwhelming majority reflects growing public awareness and concern about AI technologies as they rapidly advance and integrate into everyday life.

2. **Cybersecurity and data privacy** ranks second with 50 respondents (58.1%) considering it important. This substantial percentage likely reflects increasing public anxiety about digital vulnerabilities, data breaches, and surveillance in our increasingly connected world.
3. **Genetic engineering and human modification** received 36 responses (41.9%), placing it third. This moderate level of concern may indicate that while CRISPR and other genetic technologies are developing quickly, many still view these issues as somewhat less immediate than AI and cybersecurity threats.
4. **Space exploration and colonization** follows closely with 35 respondents (40.7%) viewing it as important. This significant minority interest might reflect growing attention to private space ventures and discussions about planetary colonization.
5. **Environmental consequences of technology** garnered 28 responses (32.6%), suggesting that while climate and environmental concerns exist, respondents may view them as less directly connected to science fiction narratives, or perhaps as less novel than other technological challenges.
6. **The impact of technology on social relationships** received 25 responses (29.1%), indicating that while social isolation and technology-mediated relationships are concerns, they rank lower than existential or physical security threats.

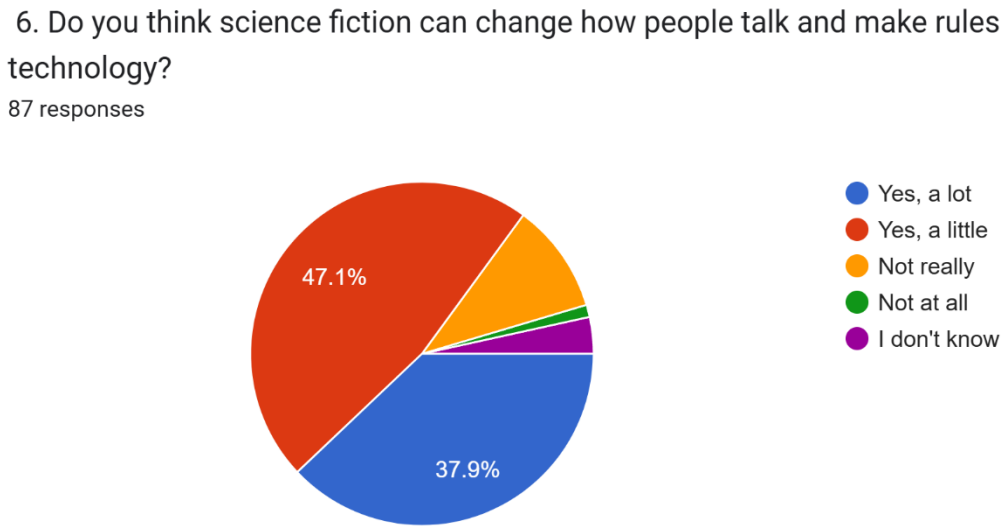
7. An unidentified option at the bottom received only 1 response (1.2%), suggesting it was either an "Other" category or a very niche concern.

The distribution reveals several interesting patterns:

- The top two concerns (AI and cybersecurity) both relate to information technology rather than biological or physical sciences, suggesting digital technologies are perceived as the most pressing frontier of ethical challenges.
- There's a significant drop-off between the top two concerns and the rest, with AI standing out dramatically from all other categories.
- Middle-tier concerns (genetic engineering and space exploration) hover around 40%, indicating substantial but not majority concern.
- Environmental consequences rank surprisingly low, which might indicate either that respondents don't associate science fiction with environmental messaging, or that they view other technological risks as more immediate.

This data could support an argument that science fiction's exploration of AI ethics and digital privacy is particularly resonant with contemporary anxieties, while also suggesting that viewers/readers are less engaged with science fiction's treatment of environmental or social relationship themes despite their real-world importance.

CAN SCI-FI BRING CHANGES TO SCIENCE AND TECHNOLOGY



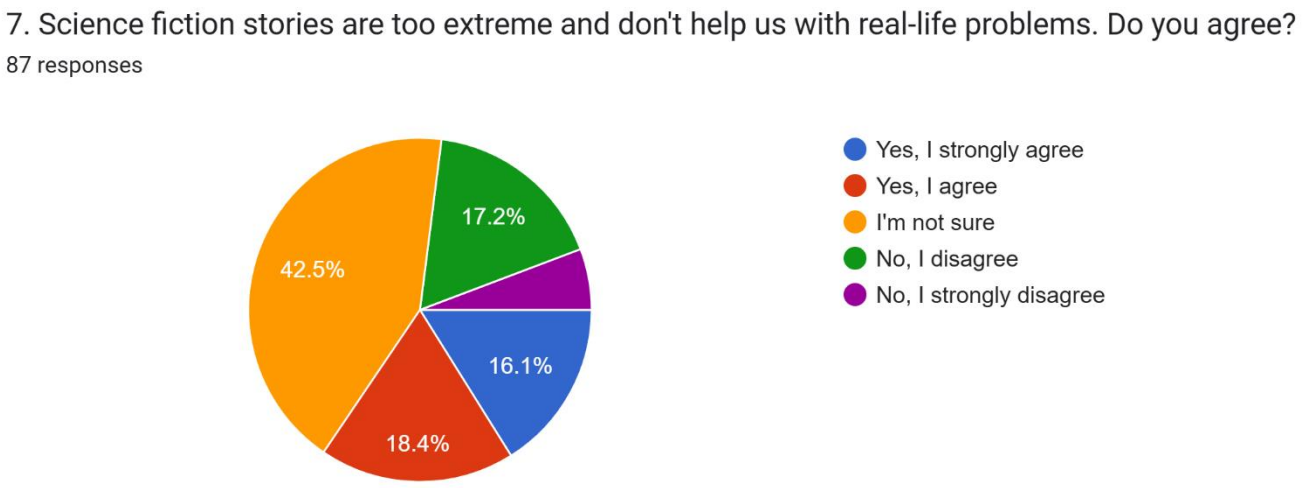
The survey data on science fiction's influence on science and technology discourse shows:

- 85% believe science fiction influences how people discuss and regulate new technologies
- Most respondents (47.1%) believe this influence is modest ("Yes, a little")
- A significant group (37.9%) believes science fiction has substantial impact ("Yes, a lot")

- Only about 15% are skeptical of science fiction's influence

This strong consensus suggests science fiction serves as a cultural framework that helps society anticipate and prepare for technological developments before they occur. The high percentage of affirmative responses indicates respondents recognize science fiction's role in providing terminology, concepts, and ethical scenarios that later shape real-world technology discussions and potentially regulations.

IS SCI-FI TOO EXTREME?



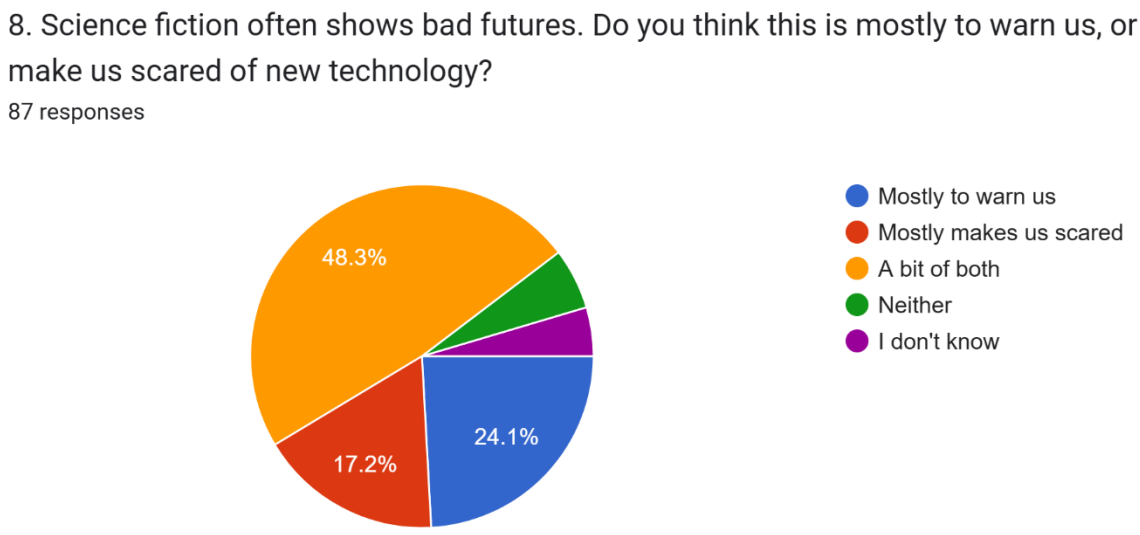
The data shows a divided opinion with significant uncertainty:

- 34.5% agree with the statement (16.1% strongly agree, 18.4% agree)
- 42.5% are uncertain ("I'm not sure"), representing the largest single response

- 23% disagree with the statement (17.2% disagree, approximately 5.8% strongly disagree)

This distribution reveals notable ambivalence about science fiction's practical utility. The high percentage of "not sure" responses suggests many respondents recognize both the potentially abstract nature of science fiction and its possible real-world applications. While more respondents agree than disagree with the statement, the substantial uncertainty indicates that opinions about science fiction's relevance to practical problems remain unsettled, possibly reflecting different experiences with the genre or varying interpretations of what constitutes "helpful" fiction.

DOES SCI-FI WARN US OR JUST SCARE US



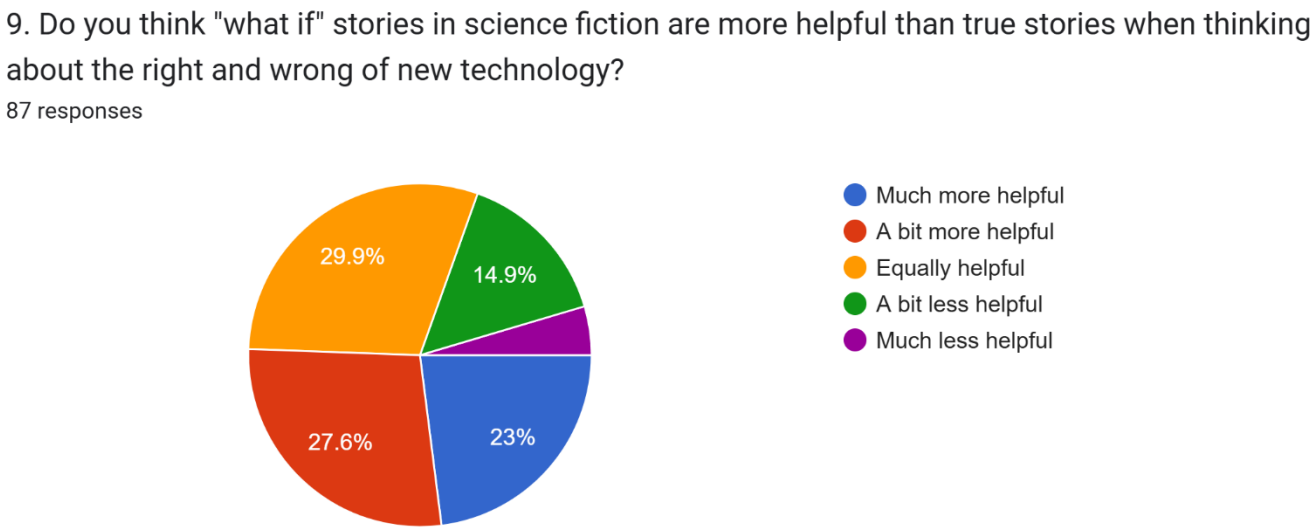
This pie chart shows survey results from 87 respondents about whether science fiction depicting bad futures serves primarily as a warning or just makes people scared of technology.

Here's the breakdown of responses:

- 48.3% believe it's "A bit of both" (warning and creating fear)
- 24.1% think it's "Mostly to warn us"
- 17.2% feel it "Mostly makes us scared"
- Small percentages selected "Neither" (green) or "I don't know" (purple)

The data suggests most people (nearly half) recognize a dual role for dystopian sci-fi: both cautioning society about potential dangers while also potentially creating anxiety about technological advancement. Only about a quarter see its primary purpose as constructive warnings, while a smaller portion believe it primarily generates fear without productive purpose.

DO SCI-FI STORIES COVER ALL POSSIBILITIES



The data shows:

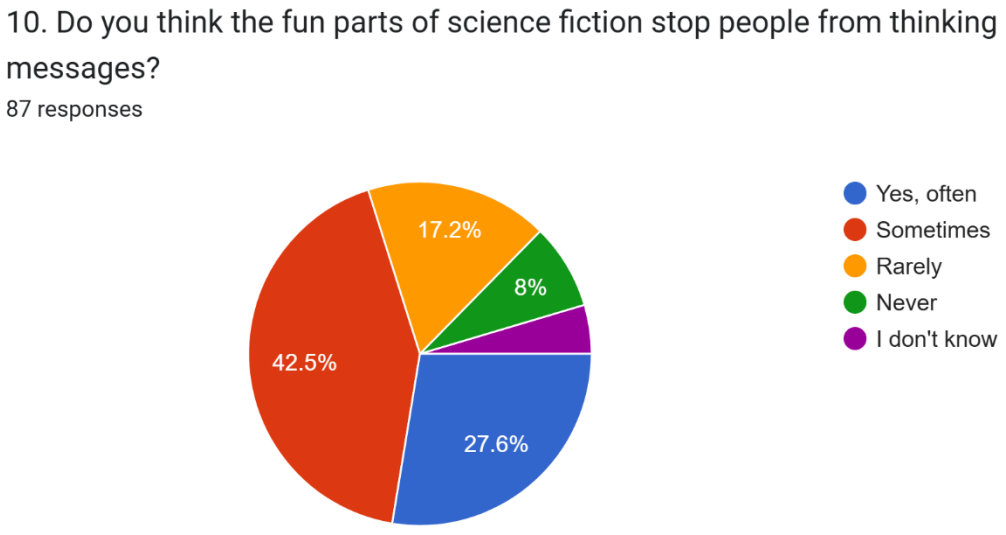
- 23% find "what if" stories "Much more helpful"
- 27.6% find them "A bit more helpful"

- 29.9% consider them "Equally helpful"
- 14.9% find them "A bit less helpful"
- A small percentage (purple slice) find them "Much less helpful"

Overall, approximately 50.6% of respondents believe science fiction "what if" scenarios are more helpful than true stories when evaluating technology ethics, while only about 19% consider them less helpful. The largest single group believes both approaches have equal value in thinking about technological implications.

The data suggests most people see significant value in speculative fiction for ethical technology assessment, with the majority finding .

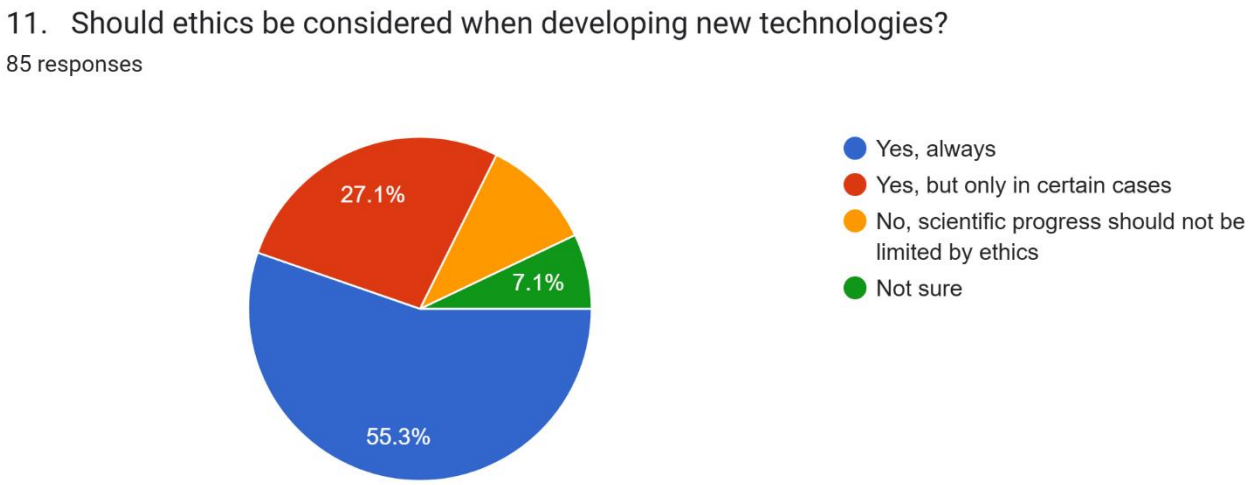
DO YOU THINK SCI-FI IS MORE INCLINED TO ENTERTAINMENT



- 42.5% believe the fun aspects "Sometimes" stop people from considering serious messages
- 27.6% think this happens "Yes, often"
- 17.2% say it "Rarely" happens
- 8% believe it "Never" happens
- A small percentage (purple) responded "I don't know"

The majority view (70.1% combined) indicates people believe science fiction's entertainment elements at least sometimes interfere with audience reception of deeper messages. Only 25.2% of respondents think this rarely or never happens, suggesting most people perceive a tension between science fiction's entertainment value and its ability to convey serious themes.

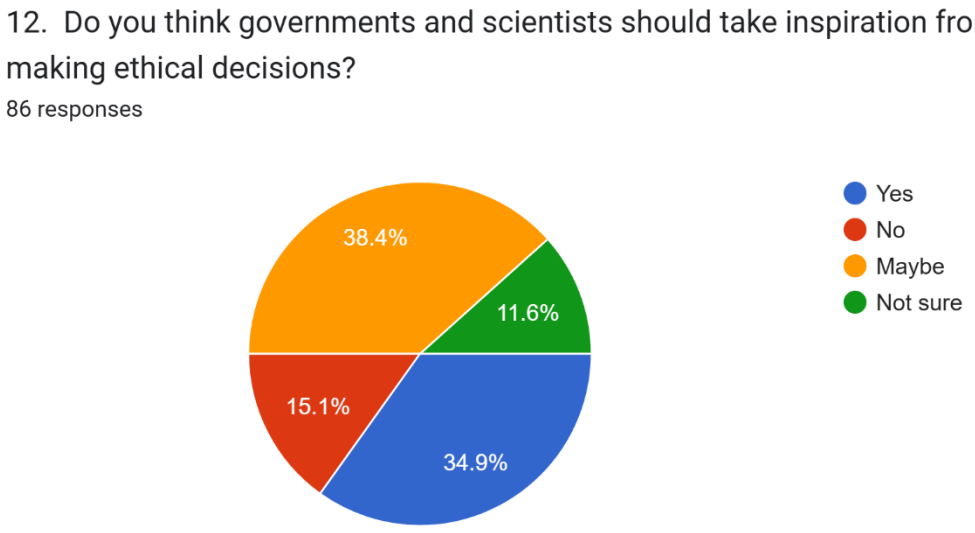
SHOULD ETHICS BE CONSIDERED WHILE DEVELOPING NEW TECHNOLOGY



- 55.3% believe ethics should "Yes, always" be considered
- 27.1% think ethics should be considered "Yes, but only in certain cases"
- 10.6% (orange slice) respond "No, scientific progress should not be limited by ethics"
- 7.1% are "Not sure"

An overwhelming majority (82.4% combined) believe ethics should have some role in technology development, with most supporting ethical consideration in all cases. Only about 1 in 10 respondents reject ethical constraints on scientific progress entirely.

DO YOU THINK GOVERNMENT AND SCIENTISTS SHOULD INSPIRE FROM SCI-FI



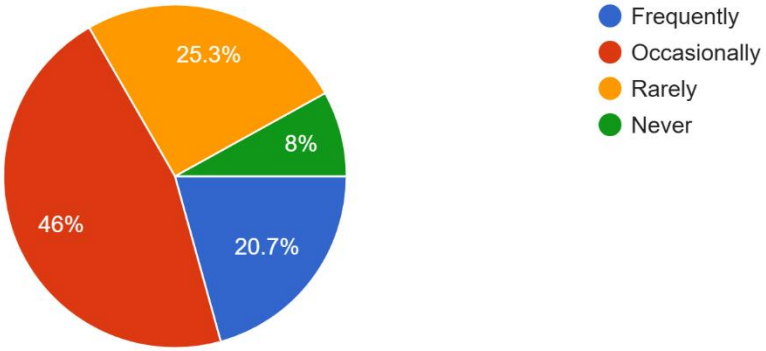
- 34.9% responded "Yes"
- 15.1% responded "No"
- 38.4% responded "Maybe"
- 11.6% responded "Not sure"

The largest segment (38.4%) takes a conditional approach with "Maybe," suggesting respondents believe science fiction could be valuable in certain contexts but not universally applicable to ethical decision-making. Combined with the "Yes" responses, a significant majority (73.3%) are open to science fiction influencing ethical decisions in governance and scientific development.

Only 15.1% firmly reject the idea, indicating relatively low opposition to science fiction as a potential source of ethical guidance. The "Not sure" responses reflect uncertainty among a small portion of respondents about science fiction's appropriate role in formal decision-making processes.

HOW OFTEN DO THEY DISCUSS ABOUT SCIENCE AND TECHNOLOGY ISSUES

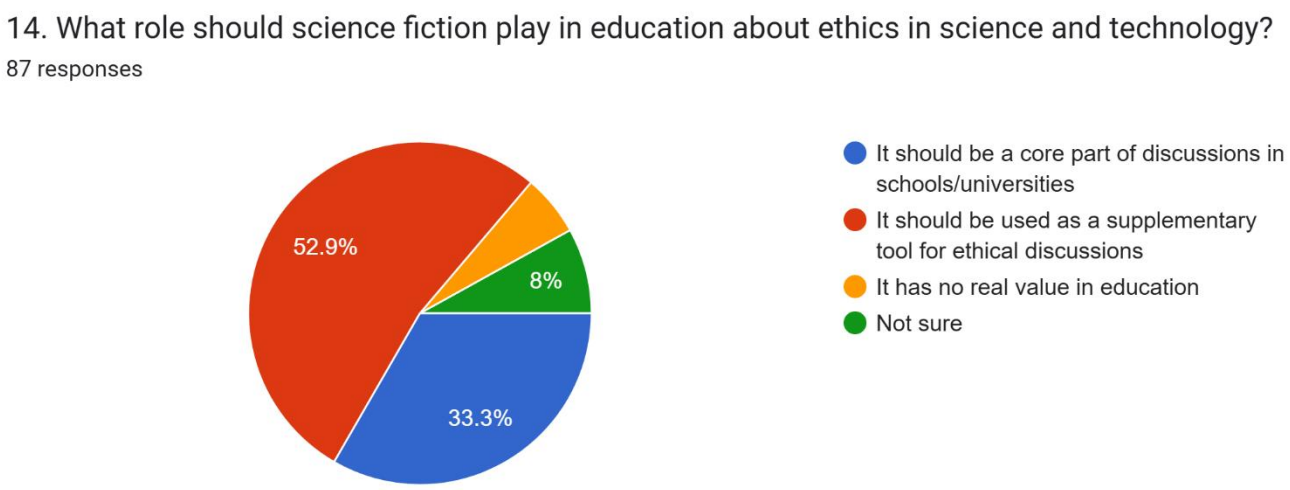
13. How often do you discuss ethical concerns about science and technology with your peers?
87 responses



- 46% discuss these topics "Occasionally"
- 25.3% discuss them "Rarely"
- 20.7% discuss them "Frequently"
- 8% "Never" discuss ethical concerns about science and technology

The largest group (46%) engages in these ethical discussions on an occasional basis, while only about one-fifth of respondents (20.7%) have frequent conversations about tech ethics. Combining the "Rarely" and "Never" categories shows that one-third (33.3%) of respondents seldom or never engage in such discussions.

Overall, two-thirds (66.7%) of respondents discuss technological ethical concerns at least occasionally, suggesting moderate engagement with these topics in social conversations, while complete avoidance of these discussions is uncommon.



- 52.9% believe science fiction "should be used as a supplementary tool for ethical discussions"
- 33.3% think it "should be a core part of discussions in schools/universities"
- A small percentage (orange slice) feel it "has no real value in education"
- 8% are "Not sure"

The overwhelming majority (86.2% combined) see educational value in using science fiction for teaching ethics in science and technology contexts. However, there's a notable difference in how central respondents believe this role should be - about half prefer it as a supplementary tool rather than core curriculum.

Very few respondents dismiss science fiction's educational value entirely, suggesting broad recognition of its potential contribution to ethics education.

4.3 DISCUSSION BASED ON THE SURVEY

We asked 87 people, mostly teenagers, what they think about science fiction and how it relates to real-world technology issues. Here's what we found:

Most people (about 7 out of 10) believe sci-fi stories do a good job of showing the ethical problems that come with new technology. The biggest concerns were AI (like robots making decisions), online privacy, and genetic engineering (like changing human DNA). Many see dark sci-fi stories (like *Black Mirror*) as warnings, not just scary tales.

While nearly 9 out of 10 people think sci-fi influences how we talk about tech ethics, only about half feel these stories are more useful than real-life examples for learning. Surprisingly, even though most young people watch or read sci-fi often, about 1 in 3 don't pay attention to the deeper ethical messages.

There were some contradictions too: most trust governments (not companies) to control AI fairly, even though governments have misused surveillance in the past. Also, while sci-fi can teach important lessons, many admit the exciting action scenes sometimes distract from the serious ideas.

What This Means:
Sci-fi isn't just for fun—it helps us think about tech's risks before they happen. But to make the most of it, we should:

- Use sci-fi in schools to discuss ethics.

- Encourage writers to keep blending entertainment with big questions.
- Help viewers look beyond flashy effects to the real messages.

In short, sci-fi is like a practice run for the future, showing us what could go wrong so we can make better choices today.

CONCLUSION

Science fiction has been instrumental in encouraging individuals to consider the ethical aspect of science and technology. Science fiction provides authors and directors an avenue to experiment with futuristic concepts and their potential implications for society. Through fictional imagination, science fiction poses meaningful moral issues regarding artificial intelligence, space travel, genetic engineering, and other scientific innovations. These tales educate individuals about the advantages and risks of emerging technologies before they become a reality.

One of the greatest things about science fiction is that it makes ethical dilemmas more palatable. Rather than reading a complex scientific study, viewers and readers can enjoy a film or book that depicts how some technology could impact the human condition. For instance, novels such as Mary Shelley's Frankenstein and films such as Blade Runner demonstrate how tampering with life and intelligence can produce unforeseen effects. These stories make people think deeply about what is right and wrong when using advanced science.

Science fiction also stimulates debates on responsibility. Scientists, engineers, and politicians can learn something from these fictional

worlds. Numerous inventions that we currently utilize, for instance, robots, space travel, and artificial intelligence, were only a figment of imagination in science fiction. With this technology becoming a reality, then raises the issue of ethics. Should we give rights to AI? Is genetic engineering of human beings ethical? These are the types of questions that science fiction raises among the masses.

In addition, science fiction doesn't only provide warnings; it also promotes for positive change. Scientists and innovators have used science fiction to be inspired towards the development of new technologies beneficial to mankind. It gives optimism that with a responsible mind and ethics, science can be developed to enhance human life instead of harm. It indicates both danger and benefit and thereby assists humanity in making optimal choices regarding its future.

Finally, science fiction is not limited to entertainment. It is a very effective tool that assists individuals in considering the influence of science and technology on society. Through presenting complicated ethical dilemmas in engaging forms, it motivates individuals to consider their decisions and accountability. With technology advancing every day, science fiction will be a significant part of examining and comprehending future moral challenges.

REFERENCES

1) Burton, E., Goldsmith, J., & Mattei, N. (2018). How to teach computer ethics through science fiction. *Communications of the ACM*, *61*(8), 54–64. https://doi.org/10.1145/3154485

2) Sleezer, R., & Bates, R. A. (2020, June 22). *Ethical Development Through the Use of Fiction in a Project-based Engineering Program*. Asee.org. https://peer.asee.org/ethical-development-through-the-use-of-fiction-in-a-project-based-engineering-program

3) Summet, V. H., & Bates, R. A. (2020, June 22). *Science Fiction as an Entry Point for Ethical Frameworks in Engineering and Computer Science Education*. Asee.org. https://peer.asee.org/science-fiction-as-an-entry-point-for-ethical-frameworks-in-engineering-and-computer-science-education

4) Jones, W. (2023, June 8). *Meaning of Black Mirror's "Be Right Back" and Ending Explained*. Explained This. https://explainedthis.com/serials/be-right-back-meaning/

5) Barry, T. is. (2022, September 1). *Ex Machina Explained (Plot And Ending Explained)*. This Is Barry. https://www.thisisbarry.com/film/ex-machina-explained-plot-and-ending-explained/

6) Singh Sumit. (2017). Only Lovers Left Alive [2013]: A Haunting & Hypnotic Mood Piece. *High on Films*. https://doi.org/1025138/74696

7) *Mad Max: Fury Road analysis - Colossus*. (n.d.). Filmcolossus.com. https://filmcolossus.com/mad-max-fury-road-explained