SURF

The Risks of Personalising Higher Education with Artificial Intelligence

Ethical Risk Report

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Context

This report was written in order to expand upon the Future Campus project currently being conducted by SURF, which is focused on what education and education spaces will look like in 2040. This report presents an original scenario based on the future scenarios of the Future Campus to illustrate the potential role of AI in education in fifteen years.[1] The report has the goal of providing an ethical perspective on the potential use of AI in personalised higher education, which appears in the Transformation and Collapse scenarios SURF developed in 2023 as part of Future Campus. This report does so by looking at the potential negative developments that may accompany AI-driven personalised higher education and providing an ethical viewpoint for understanding potential developments, their problems, and possible mitigation strategies.

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[1] Future Campus, "Future Campus," accessed 9th of April, 2025, https://futurecampus.nl/.

Executive Summary

This report explores the ethical risks of implementing AI to personalise the content, form, and teaching process of higher education. While AI promises customised learning experiences, increased accessibility, and higher efficiency, it comes with many challenges. Using a speculative future scenario that takes place in 2040 and is grounded in current trends, we examine how AI-driven personalised learning may impact students, educational institutions, and society at large.

The key risks for students include:

- Homogenised learning and undiversified learning content perpetuated by echo-chambers
- Diminished critical thinking skills
- Loss of shared knowledge and collaborative learning, associated with epistemic fragmentation

They key risks for the educational sector include:

- Unwanted corporate influence
- Privacy issues
- Unequal access to AI-driven personalised education
- Drastic changes to the role of the teacher

The key risks for the larger society include:

- Threatened democratic values and competence
- Environmental harm

Using the frameworks of techno-moral change and the goods of education, this report evaluates the mentioned risks and gives **recommendations** to minimise them. These emphasise limiting the extent of AI-driven personalisation by preserving mandatory core curricula, ensuring equal access and protected privacy, while safeguarding the role of teachers. By adopting a cautious ethical approach, AI-driven personalised higher education can enhance rather than undermine educational goals.

A Glimpse into Higher Education in 2040

The year is 2040, the capabilities of artificial intelligence have gradually become more and more powerful. AI is implemented in almost all aspects of human life, where it allows for better performance, higher accuracy, and more efficiency over human alternatives. One such revolutionary implementation is the use of AI in higher education, creating and teaching personalised courses for everyone. AI in higher education now allows students to input exactly what they want in their education into a system to create a completely personalised education track to meet their wants and needs. An AI teacher then works individually with each student so that they learn as efficiently as possible. This individual teaching is augmented further by using AI to create teacher avatars in 3D spaces for the students to see as they learn. This allows the classes to be engaging whilst also removing problems associated with students simply looking at a screen for all their classes. Students learn at different speeds and no study plan is the same. Nearly everyone manages to complete their education, since it is geared exactly towards their needs, even if it takes longer for some.

Universities have more time and money to spend on non-teaching related efforts, since AI is taking care of creating and teaching courses. Very few higher education programs still standardise their curriculums. However, traditionally strongly standardised degrees such as medicine still heavily use AI to help in diagnostics and predictive measures. Students in practical education can practice their skills in AI-generated environments, such as doing electrical work on a house, without being the risk of damaging a real house or expensive tools.

Whilst personalised higher education appears to have revolutionised the way students learn and grow in 2040, there are underlying issues that cause significant debates about whether AI actually improves education. Soon after personalised education using AI became common, students began graduating without developing the critical thinking skills of their peers who chose conventional education tracks. Furthermore, many students graduate higher education without learning about diverse perspectives in their classes, since the AI-generated curriculum closely follows the students' interests without expanding the courses' content. These unintended consequences have even begun to affect the ability for countries to run democracies, due to a growing citizenry unopen to and unaccepting of the perspectives of their peers.

Content

1 Introduction

The explosive growth of Artificial Intelligence (AI) already has and will continue to impact all parts of life, including higher education. An AI advancement that will likely play a role in the future is the personalisation of higher education using AI, with some tools such as RevisionDojo already utilising AI to help students.[2] Personalized higher education would provide individuals with highly personalised learning paths that cater to exactly what they want and need. This advancement could aid students with learning disabilities by adapting to their individual learning path, break language barriers, consider individual needs and abandon a one-size-fits-all model of education.[3] AI could allow personalisation to stretch far beyond building a personalised curriculum for students: it may ultimately enhance or replace teachers by acting as a private tutor that is tailored exactly to the students' needs.[4]

However, to effectively and beneficially implement personalised learning (PL) through AI, it must be understood both in terms of the potential benefits and the potential risks that may accompany it. Only by understanding the potential risks, can both universities and companies ensure the responsible use and development of AI.

The definition of AI we work with in this report is broad. It encompasses both generative AI systems and the algorithms that are needed to gather data and personalise education accordingly. We do not limit the definition to any specific existing model(s), since it is unsure what type of systems will be used in the future. We are not focused on how the future AI systems work or potential implementation costs, but in the potential *consequences*.

To uncover these consequences and risks, this report will answer the research question, *what are the risks of personalising higher education using AI?* Using the scenario "A Glimpse into Higher Education in 2040," this report will delve into the potential risks of AI-driven PL. The scenario is not a set-in-stone prediction of what will happen in the future, but rather a glimpse into one possible future. The report will investigate how and why certain risks may arise, why they are risks, and give recommendations on how they can be avoided or

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[2] RevisionDojo. "A Complete Guide to Using AI for A-Level Prep." RevisionDojo. Published 11th February 2024. https://www.revisiondojo.com/blog/a-complete-guide-to-using-ai-for-a-level-prep.
[3] Owoseni, Adebowale, Oluwaseun Kolade, and Abiodun Egbetokun. *Generative AI in Higher Education: Innovation Strategies for Teaching and Learning*. Cham: Springer Nature Switzerland, 2024. https://doi.org/10.1007/978-3-031-60179-8; Yılmaz, Özkan. "Personalised Learning and Artificial Intelligence in Science Education: Current State and Future Perspectives." *Educational Technology Quarterly* 2024, no. 3 (20 September 2024): 255–74. https://doi.org/10.55056/etq.744.
[4] Yılmaz, "PL and AI in sci. education"

mitigated. The risks are connected and intertwined, which complicates the task of dividing them into sections. Therefore, this report is split into three spheres of influence: the immediate risks to students, the risks to the educational sphere, and the risks to wider society. This division shows that different levels of society will be impacted by AI-driven PL. However, the risks bleed into all spheres, thus for clarity each risk has been placed under the sphere in which they are most significant. A limitation of this structure is that the risks cannot be neatly placed into any of the spheres because they overlap with all of them. However, the overlap shows how complicated some of the risks are, and that they might impact many aspects of life and society. The risks we identify in this report in their respective spheres can be seen in *figure 1*. Importantly, these risks act only as conceptions of what may occur if certain actions are taken, even the 2040 scenario itself may never come to fruition if society decides that personalised higher education is not wanted, profitable, or effective. This also means that any scenarios in this report act as possible futures of what may happen if precautions are not taken when developing and implementing AI-driven PL.

The risk analysis is conducted through the lens of techno-moral change, the idea that technologies alter the moral practices and beliefs of society.[5] Using the lens of techno-moral change in the report allows for exploring not only what may change regarding actual practices, but also for uncovering what underlying moral and ethical implications arise due to and alongside these. In addition, the report makes use of the goods and values that stem from the philosophy of education, which refer to the benefits generally received by individuals from their education.[6] Our analysis then evaluates the severity of risks based on the impact they potentially have on the goods and values of education. In the following sections we will introduce the potential benefits of personalised learning and explain the framework of techno-moral change and the goods of education used. After this, the report will delve into the risks of personalised learning that uses AI.

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[5] John Danaher and Henrik Skaug Sætra. "Mechanisms of Techno-Moral Change: A Taxonomy and Overview." *Ethical Theory and Moral Practice* 26, no. 5 (November 2023): 763–84. https://doi.org/10.1007/s10677-023-10397-x.

[6] Harry Brighouse, Helen F. Ladd, Susanna Loeb, and Adam Swift. "Educational Goods and Values: A Framework for Decision Makers." *Theory and Research in Education* 14, no. 1 (March 1, 2016): 3-4. https://doi.org/10.1177/1477878515620887.
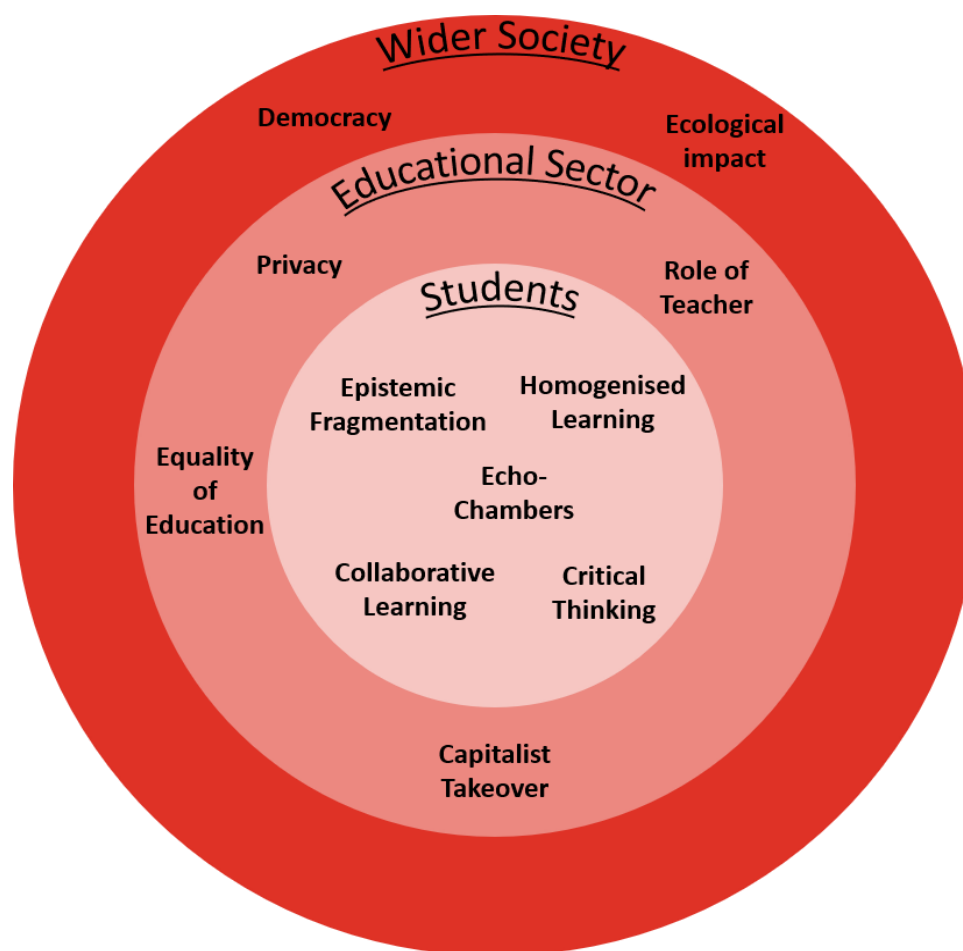
Figure 1: *The risks of AI-driven PL visualised in the three spheres of impact*.

1.1 Personalised Learning and its Benefits

Personalised learning broadly refers to the act of altering different aspects of the learning process to fit the wants and needs of a student.[7] A current example of PL is providing support to struggling students via tutoring, creating personalised study plans and learning paths, or personalising the assessment method. These examples are concerned with the *form* of education – the how and how much a student learns. However, PL can also refer to altering the educational *content* being taught so that it more accurately reflects what a student is interested in or will require in the future. Examples include giving additional challenging material to students who are not challenged enough or students electing to pursue courses they are interested in. This report will focus on changing the educational content that is being taught.

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[7] Ling Zhang, James D. Basham and Sohyun Yang. "Understanding the implementation of personalized learning: A research synthesis." *Educational Research Review* 31 (November 2020). https://www-sciencedirect-com.utrechtuniversity.idm.oclc.org/science/article/pii/S1747938X19306487.

Yet, in the future, the AI-driven personalisation of content could go a step further and customise the complete curriculum for every student, thereby also changing the role of the teacher. For example, AI could generate personalised avatars to teach or guide students through augmented reality (AR), allowing students to have a visible teacher (embodied AI) instead of relying on a disembodied AI voice on a screen to teach them.

Many scholars see strong benefits associated with personalized learning. Current research into personalised learning shows that personalised support and instructions tailored towards a student's needs and strengths achieved better

What is AI-driven Personalised Learning?

AI-driven PL refers to any educational track that utilises Artificial intelligence to personalise either the content or form of the education. The amount of personalisation and the total AI influence can range from almost none to entirely AI-based.

outcomes than those who did not, such as improved grades, higher engagement, and a better attitude towards learning.[8] Moreover, studies have shown that PL has an impact on more than just performance; it can also lead to increased motivation and meta-cognitive skills for students.[9] Students with learning disabilities or students who simply do not benefit from

*Whilst **personalised learning** gives students power over their education, if AI decides what is best for students some autonomy may be lost.*

traditional instruction methods benefit from personalised teaching that is geared towards their individual needs.[10] Thus, an offer of countless personalised courses in the future may also prompt more

individuals to attend (higher) education who are currently struggling with the traditional means of instruction. In addition, the digital nature of AI-driven PL could allow individuals who cannot afford to travel and live in another country to do their preferred degree at a distance. On the institutional level, AI-driven PL could allow universities to vastly expand their course offerings and ability to take on new students, as it could decrease teaching staff's workload.

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[8] Zhang, Basham and Yang, "Understanding the implementation of personalized learning," 2-3.
[9] Zhang, Basham and Yang, "Understanding the implementation of personalized learning," 2-3.
[10] Owoseni, Oluwaseun, and Egbetokun. "Generative AI in Higher Education;" Yılmaz, "Personalised Learning and Artificial Intelligence in Science Education: Current State and Future Perspectives."

Consequently, universities could dedicate more resources to non-teaching-related aspects, such as research and student well-being. Lastly, on a societal level, higher education could become more accessible, encouraging students to pursue university education when they otherwise would not. This would allow more individuals to acquire the skills required for jobs, giving people access to career paths that otherwise may not have been viable.

These potential benefits arise from a highly personalised future that is extremely different from today's education model. However, current studies on PL focus on the form, such as personal study plans, which is why we will focus on the implications of personalised educational content. The lack of research on customised content in education is what this report will address. Most of the research in this direction misses a nuanced perspective acknowledging the different interpretations of perceived benefits and some effects are flagged as beneficial when on closer inspection this may not be the case. Furthermore, many proponents of AI-driven PL emphasise the advantages of using AI to personalise learning, yet fail to clearly define it or explain how exactly AI could achieve the beneficial results they claim.[11] This report aids people who work in higher education by explaining what using AI-driven PL entails, how it may potentially lead to risks, and how these risks can be mitigated.

1.2   The Current State of AI-driven Personalised Learning

Whilst the 2040 scenario has already been presented, to understand how AI-driven personalised higher education may become reality, the current state of personalised learning using AI must be explored. Currently, the use of AI in PL is minimal, however there are already some companies that have begun to utilise AI to help students learn more efficiently. Tools and websites such as RevisionDojo use AI to allow students to receive immediate feedback on practice papers and exams, allowing them to reduce the amount of time it takes to figure out what they need help with.[12] Furthermore, these tools use AI to create custom learning tracks to help students reach their goals or find weak points to work on. This extends to creating

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[11] Ethan Castro, Saurabh Sinha and Catherine Moran. "How Artificial Intelligence can Personalize Education." IEEE. Published 18th December, 2023, https://spectrum.ieee.org/how-ai-can-personalize-education; Meehirr K. "How AI Is Personalizing Education For Every Student." eLearning Industry. Published 6th June, 2023. https://elearningindustry.com/how-ai-is-personalizing-education-for-every-student; K. Bayly-Castaneda, M.-S. Ramirez-Montoya, and A. Morita-Alexander. "Crafting Personalized Learning Paths with AI for Lifelong Learning: A Systematic Literature Review." *Frontiers in Education* 9 (August, 2024). https://doi.org/10.3389/feduc.2024.1424386.

[12] RevisionDojo. "A Complete Guide to Using AI for A-Level Prep."

practice exams and using AI so that students can build their confidence in exam situations whilst focusing on what students struggle with. While it is difficult to judge the effectiveness of these tools, studies on personalised learning, with and without AI, have shown that there are many benefits associated with personalising the education process, such as enhanced learning outcomes.[13]

Whilst the current state of AI-driven PL focuses mostly on the revision aspect of learning, it is clear that AI can be used to personalise the learning process further. Even though the capabilities of these AIs are currently limited, given that AI can already create study plans, teach, and assess, the framework for creating a fully personalised AI learning environment already exists. Furthermore, popular learning resources such as Khan Academy have already stated that they use AI

Personalised learning currently focuses mainly on tutoring, however the blueprint for combining content creation and teaching is already visible.

to aid in creating courses for their websites, although these need to be reviewed by humans for errors and AI cannot generate entire courses on their own yet.[14] However, with the current rate that generative AI is improving, and the fact that the global education market is projected to be worth around $8 trillion by 2030, it seems likely that in the near future companies will develop AIs tailored to course creation.[15]

2   Theoretical Framework

The following sections will explain the concept of techno-moral change and the goods of education. Techno-moral change functions as the basis of this report, justifying the need to critically look at the potential impacts technological developments may have on society. The impact that AI can have on society will be tied together in the end, presenting a big picture of

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[13] Oyebola Olusola Ayeni, Nancy Mohd Al Hamad, Onyebuchi Nneamaka Chisom, Blessing Osawaru, and Ololade Elizabeth Adewusi. "AI in Education: A Review of Personalized Learning and Educational Technology." *GSC Advanced Research and Reviews* 18 (February 2024). https://gsconlinepress.com/journals/gscarr/content/ai-education-review-personalized-learning-and-educational-technology.

[14] KhanAcademy. "How does Khan Academy use AI in our content development process?" Accessed 7th April, 2025. https://support.khanacademy.org/hc/en-us/articles/20349258135181-How-does-Khan-Academy-use-AI-in-our-content-development-process.

[15] Morgan Stanly. "Global Education's $8 Trillion Reboot." Morgan Stanly. 7th June 2023. https://www.morganstanley.com/ideas/education-system-technology-reboot.

the moral impact AI-driven PL can have. The goods of education are used to measure and predict the potential impacts of personalised learning and classifying them as risks if the impact is negative.

2.1 Techno-Moral Change

Technologies throughout history have affected humanity and the very structure of society. From shaping how we view hygiene with the invention of the bath and shower, to telephones changing societal expectations regarding when people should be available. This phenomenon is known as techno-moral change, which refers to "the idea that technologies can change moral beliefs and practices."[16] The reverse is also true for techno-moral change, as technology can change morals, but the morals that a society holds

> ### *Techno-Moral Change:*
>
> *The idea that technologies can influence moral beliefs and social practices, and that moral beliefs and social practices can influence technology.*

also influences technological developments.[17] However, techno-moral change is not just limited to the cycle of technologies and morals influencing each other, it also refers to how ethical concerns and values can guide the development of technology.[18]

The changes associated with techno-moral change can range from minor alterations in the behaviour and norms of a society to remoulding how society behaves and functions. Scholars have investigated historical case studies of techno-moral revolutions and current cases of impeding techno-moral change, illustrating how it is a two-way dynamic.[19] We will use this bi-directional conception of techno-moral change as a method of anticipation to highlight the potential impact that AI-driven PL might have on society and its moral beliefs. This is reflected in the report itself, as our current understanding of education and what it should provide shapes the view of what AI-driven personalised education should look like in

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[16] Danaher and Sætra. "Mechanisms of Techno-Moral Change."

[17] Danaher, John. "Generative AI and the Future of Equality Norms." *Cognition* 251 (October 2024): 105906. https://doi.org/10.1016/j.cognition.2024.105906.

[18] Katharina Bauer, and Julia Hermann. "Technomoral Resilience as a Goal of Moral Education." *Ethical Theory and Moral Practice* 27, no. 1 (March 1, 2024): 59-60. https://doi.org/10.1007/s10677-022-10353-1.

[19] J.K.G. Hopster et al. "Pistols, Pills, Pork and Ploughs: The Structure of Technomoral Revolutions." *Inquiry* 68, no. 2 (7 February 2025): 264–96. https://doi.org/10.1080/0020174X.2022.2090434; Danaher, "Generative AI and the future of Equality Norms."

the future. We will regularly refer to the previously illustrated 2040 scenario throughout the analysis, as is common in previous works in techno-moral change.

Since techno-moral change encompasses how technology can change what people view as valuable and permissible and how this causes people to act, we borrow the conception of morality proposed by Hopster and colleagues.[20] They state that morality refers to "sets of practices, beliefs and institutions indicative of what a society regards as obligatory and valuable."[21] We work with morality of Western societies, specifically that of the Netherlands.

The framework of techno-moral change was chosen over alternatives, such as technological determinism or instrumentalism, because it allows for a more nuanced ethical reflection. In line with our speculative report, the most effective method to evaluate a possible future of AI in PL must leave room for the co-evolution of technology and society. Where technological determinism assumes an inevitable future of technology, and instrumentalism reduces technology to a neutral tool for humans to use as they see fit, techno-moral change acknowledges a more nuanced view of the mutual impact of society and technology. Danaher explains this co-evolution by emphasising "that technology has the power to change social morality is not to say that it is the sole determinant of such changes, nor that social morality cannot reciprocally affect the development of technology."[22]

Much work in techno-moral change abstains from judging moral developments but rather acknowledges the role of technology in those developments. However, we need to judge the possible impact of AI-driven PL to distinguish risks and benefits. Thus, we need a basis to measure positive and negative impacts. To fulfil this role, we make use of ethical theory – specifically the philosophy of education – and evaluate the impact of AI-driven PL by measuring its effect on the goals of education for students and society.

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[20] John Danaher, and Henrik Skaug Sætra. "Mechanisms of Techno-Moral Change: A Taxonomy and Overview. 776.
[21] Hopster et al, "Pistols, Pills, Pork and Ploughs: The Structure of Technomoral Revolutions," 266.
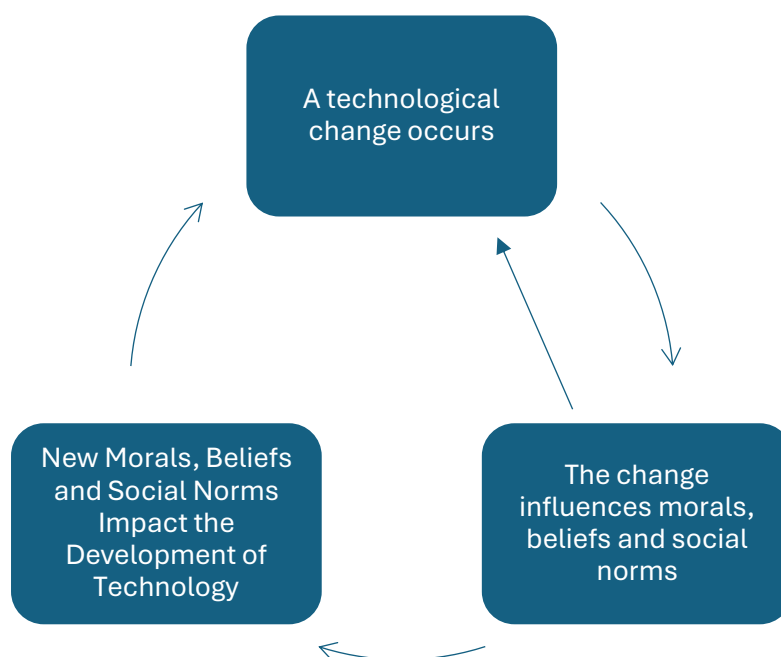[22] Danaher, "Generative AI and the future of Equality Norms," 2.

Figure 2: Visualisation of techno-moral change.

2.2   The Basic Goods of Education

Whilst the goods associated with education are numerous and nuanced, there are three simple goods that need to be made explicit in order to fully explore the potential effects of AI-driven PL. The first of these goods is simply **knowledge**.[23] Education at its core is a process of knowledge acquisition. Whether the knowledge is used to gain certain skills, understand certain topics better, or to enable human flourishing, the sharing and obtaining of knowledge is the foundation of all education. This makes it one of the core goods of education as it facilitates the ability to obtain the other goods in the first place.

Similarly to knowledge, education is also supposed to build upon a student's general **cognitive ability**, such as improving critical thinking and problem-solving skills, whether generally or regarding a specific field or topic.[24] Cognitive ability however does not just refer to being directly trained to solve a problem in a certain way. The act of obtaining more knowledge itself aids in a student's ability to think critically or solve problems by exposing them to new information.

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[23] Richard Rothstein, and Rebecca Jacobsen. "The Goals of Education." *Phi Delta Kappan* 88, no. 4 (December 1, 2006): 264–72. https://doi.org/10.1177/003172170608800405.
[24] Richard Rothstein, and Rebecca Jacobsen. "The Goals of Education." 264–72.

Lastly, higher education is supposed to provide students with **skills** that are related to their field of study, their goals as a student, and general skills, such as studying techniques.[25] Whilst the exact skills that are to be gained differ between different students – as a medical student will have no need to learn how to work a film camera the way a film student needs to – all education tracks have certain goods associated with them in the form of specific skills.

Knowledge	Cognitive Ability	Skills

Figure 3: The basic goods of education

2.3 The Six Advanced Goods of Education

Alongside the basic goods of education there are some more nuanced goods of education that are born out of the basic goods. The advanced goods are vital for understanding the consequences AI-driven PL may have, as they are not as straightforward as the basic goods. These goals and goods of education are put into a framework by Brighouse and colleagues.[26] The authors introduce the concept of educational goods, referring to knowledge, skills, and attitudes that help the student and society. These goals are determined by distinguishing their vital role in flourishing lives. They identify six educational goods: economic productivity, personal autonomy, democratic competence, healthy personal relationships, treating others as equal, and personal fulfilment. We will use these goods as measurement to evaluate if an

The Six Advanced Educational Goods:
(1) Economic productivity.
(2) Personal autonomy.
(3) Democratic competence.
(4) Healthy personal relationships.
(5) The capacity to treat others as equals.
(6) Personal fulfilment.

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[25] Paul Ashwin. "The Educational Purposes of Higher Education: Changing Discussions of the Societal Outcomes of Educating Students." *Higher Education* 84, no. 6 (December 1, 2022): 1233–1235. https://doi.org/10.1007/s10734-022-00930-9.

[26] Brighouse et al, "Educational Goods and Values."

impact of PL using AI is a risk. An impact will be flagged as a risk if it negatively impacts at least one of the educational goods.

Education preparing for *economic productivity* refers to teaching students the skills and knowledge that are rewarded in the labour market. The authors emphasise that it is both beneficial for students to be prepared to participate in the economy and generate income for themselves, and beneficial for society to have an increased human capital.

Fostering *personal autonomy* in education is associated with the different needs and wants of every student. People flourish in different lives, including jobs, relationships, and activities. Personal autonomy helps students to make well-informed decisions on what is good for them personally. A "capacity to judge for themselves, and freedom to act on that judgement" will help students make decisions in their best interest and aid in their well-being.[27]

Since we base this report on Western societies, *democratic competence* is another educational good that Brighouse and colleagues determine as crucial to a flourishing life. The authors do not limit this capacity to a specific definition of participating in democracy but highlight the importance of simply being able to. We follow this conception and do not prescribe strong political engagement or challenging the law as democratic competence but see it as a sufficient understanding of political matters and being able to engage.

Educational institutions also ought to teach the capacity for *healthy personal relationships*. This includes promoting attributes linked to this capacity, such as trust, openness, and kindness.

The capacity to *treat others as equals* ought to be taught in education. Brighouse and colleagues emphasise the importance of acknowledging all people have equal moral status. Especially individuals who are the victims of discrimination – such as people of colour, women, or people with disabilities – can only flourish if people are taught that humans are morally fundamentally equal. The authors stress that one need not only have this capacity but also exercise it.

Students should also get exposure to activities that engage different faculties, such as sports music, literature, or the arts. Enhancing a capacity for *personal fulfilment* means

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[27] Brighouse et al, "Educational Goods and Values," 9.

broadening students' horizons in those fields should be a part of education, as well as inspiring personal fulfilment in educational disciplines.

Lastly, as education inherently is supposed to impart the good of knowledge onto those who pursue it. All the previously mentioned goods of education are accessed by students through the knowledge that they gain during their education.

These educational goals enable us to assess the possible risks of AI-driven PL. They aid us in basing our analysis on a perspective of education that focuses on both individual well-being and societal flourishing.

Economic Productivity	Personal Autonomy	Democratic Competence
Ability to Form Healthy Personal Relationships	The Capacity to Treat Others as Equals	Personal Fulfilment

Figure 4: The advanced goods of education

3 The Unintended Effects of AI-driven PL on Students

In 2040, due to the increased usage of AI and the switch to individual personalised higher education, students are graduating without developing the same critical thinking skills as their predecessors. Furthermore, whilst higher education used to be known for expanding the perspectives and views of students, higher education now seems to simply reinforce beliefs and close off students to outside views. Since students are taught individually, peers do not interact with each other anymore.

Continuous interaction with AI shapes the learning experience and learning outcomes. This section dives into the risks that may befall students if AI-driven PL is not carefully monitored, followed by potential mitigation strategies that could help minimise these risks from manifesting in the first place.

3.1 What are the Risks?

Risks for Students:
(1) Homogenized learning
(2) Echo-chambers
(3) Critical thinking
(4) Collaborative learning
(5) Epistemic fragmentation

AI's role in PL as seen in our scenario would be able to tailor the speed, format, and assessment of education, as well as personalise all content to the students' wants and needs. However, extrapolating current trends of AI use, students

who rely too much on AI tend to generate **homogenised** learning outcomes. Personalisation leading to homogenisation sounds contradictory yet can be possible. Since AI is trained on specific datasets, mostly Western, AI outputs tend to generate similar content. Current generative AI will therefore give similar answers to different prompts placed by different students. The assignments that students hand in using the results from these prompts thus are more similar than when students work on assignments independently.[28] This could result in a future where, whilst students receive personalised educations, their outputs and learning

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[28] Kristjan-Julius Laak, Rania Abdelghani, and Jaan Aru. "Personalisation Is Not Guaranteed: The Challenges of Using Generative AI for Personalised Learning." In *Innovative Technologies and Learning*, edited by Yu-Ping Cheng, Margus Pedaste, Emanuele Bardone, and Yueh-Min Huang, 14785:40–49. Lecture Notes in Computer Science. Cham: Springer Nature Switzerland, 2024. https://doi.org/10.1007/978-3-031-65881-5_5.

experiences are all similar due to their AI teachers working from the same data sets. If the data used is mainly of Western origin, students would not be presented with non-Western perspectives in their education without explicitly asking for it. As a result, students who do not go into their education searching for different worldviews would likely not be confronted with them. Similarly, students interested in science would not be confronted with ethics or sustainability if they do not ask for it, which could produce a homogenised group of scientists, never focused on the ethical or environmental implications of their experiments. This would be a similar phenomenon to groupthink, where viewpoints that have a consensus are accepted rather than the viewpoint that is most logical or rational.[29]

A further complication associated with highly personalised and non-diverse learning content is the creation of **echo-chambers**. Echo-chambers are an environment where people are exposed only to opinions that reinforce their already existing beliefs, resulting in confirmation bias.[30] Abundant in social media platforms, they arise from filter bubbles, which personalise content

Echo-Chamber:
A social environment where an individual has their own opinions and views constantly reflected and reinforced.

based on past behaviour and limit exposure to diverse perspectives.[31] Echo-chambers currently play a role in homogenising online culture on social media platforms, based on the personalisation algorithms the platforms use.[32] We envision the risk of personalised learning AIs being homogenised due to their Western training data and potentially personalizing each student's curriculum to the point where a student's program could be considered an echo-chamber.

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[29] Anna Schmidt. "Groupthink." Encyclopædia Britannica. Accessed April 1, 2025. https://www.britannica.com/science/groupthink.

[30] C. Thi Nguyen. "ECHO CHAMBERS AND EPISTEMIC BUBBLES." *Episteme* 17, no. 2 (June 2020): 141–43. https://doi.org/10.1017/epi.2018.32.

[31] Katharina Klug and Charlotte Strang. "The Filter Bubble in Social Media Communication: How Users Evaluate Personalized Information in the Facebook Newsfeed." In *Media Trust in a Digital World*, edited by Thomas Osburg and Stephanie Heinecke, 159–80. Cham: Springer International Publishing, 2019. https://doi.org/10.1007/978-3-030-30774-5_12.

[32] Salsa Della Guitara Putri, Eko Priyo Purnomo, and Tiara Khairunissa. "Echo Chambers and Algorithmic Bias: The Homogenization of Online Culture in a Smart Society." Edited by M.N. Madjid, A. Hariharasudan, A.T. Wati, J. Sardi, and I. Güler. *SHS Web of Conferences* 202 (2024): 05001. https://doi.org/10.1051/shsconf/202420205001.

Drawing on another insight contributed by Laak and colleagues, the heavy use of AI in PL can also lead to a decrease in the **critical thinking** capacities of students.[33] Currently, generative AI works by answering questions and prompts in real time and providing answers that draw from an immense database and immediate access to the internet. According to Laak and colleagues, when students use AI to help in their studies, they rely heavily on what the AI tells them without thinking for themselves.[34] If we extrapolate this function of AI to the future, this manner of AI usage could lead to students graduating without gaining appropriate critical thinking skills.

Another reason critical thinking capacities would be limited is the lack of **collaborative learning** in our future scenario. Collaborative learning refers to learning and working in group settings, whether with or against others.[35] Its benefits range from social benefits, such as helping students build diverse knowledge and viewpoints, to aiding students with building self-esteem, and promote crucial critical thinking skills.[36] If every student has their own personalised learning path, interactions with other students in cohort would be limited since no two students have the same curriculum.

A concept to describe this loss of peer-to-peer contact and relations is **epistemic fragmentation**. It happens when individuals lose contact or shared knowledge with their peers.[37] Just like echo-chambers, epistemic fragmentation is prevalent on social media, where algorithms create personalised digital environments for consumers that cut them off from their peers. No two people have the same social media feed, since different content is recommended to every user based on their interests. It is impossible for

> *Epistemic fragmentation:*
> *A phenomenon where individuals lose shared knowledge and understanding due to certain circumstances, such as social media algorithms personalising the experiences of individuals.*

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[33] Kristjan- Julius Laak, Rania Abdelghani, and Jaan Aru, "Personalisation Is Not Guaranteed;" Ali Darvishi et al. "Impact of AI Assistance on Student Agency." *Computers & Education* 210 (March 2024): 104967. https://doi.org/10.1016/j.compedu.2023.104967.

[34] Kristjan-Julius Laak, Rania Abdelghani, and Jaan Aru. "Personalisation Is Not Guaranteed"

[35] Marjan Laal and Seyed Mohammad Ghodsi. "Benefits of Collaborative Learning." *Procedia - Social and Behavioral Sciences, World Conference on Learning, Teaching & Administration - 2011*, 31 (January 1, 2012): 487–88. https://doi.org/10.1016/j.sbspro.2011.12.091.

[36] Marjan Laal and Seyed Mohammed Ghodsi, "Benefits of Collaborative Learning."

[37] Silvia Milano, Brent Mittelstadt, Sandra Wachter, and Christopher Russell. "Epistemic Fragmentation Poses a Threat to the Governance of Online Targeting." *Nature Machine Intelligence* 3, no. 6 (June 2021): 466–467. https://doi.org/10.1038/s42256-021-00358-3.

individuals to figure out what exactly they are missing out on, since they never encounter the content they are missing. Epistemic fragmentation is also prevalent in targeted advertising, where no two people receive the same ads and thus are unaware of what they are missing out on and unable to create shared experiences and knowledge with their peers.

3.2   Why are they Risks?

The homogenisation of learning, lack of critical thinking, collaborative learning, and epistemic fragmentation all negatively affect the educational goals outlined by Brighouse and colleagues.

A shortfall of diverse, non-Western content in a homogenised learning space increases cultural intolerances and can go as far as further intrenching colonial mindsets.[38] The capacity to treat others as equals and attribution of equal moral worth suffers in the face of homogenous, Western learning content. Students can get the impression their culture and views are superior if they are not exposed to other possibilities. People can become especially susceptible to extremist and discriminatory worldviews if they are caught in an echo-chamber that continuously reinforces extremist perspectives, limiting the capacity to treat others as morally equal even more.[39] In addition, reduced collaborative learning due to less contact with peers minimises the contact with other views even more and allows for less openness and tolerance.[40] These traits are needed for building healthy personal and work relationships, their stagnation in turn limiting this capacity as well.

Taking things further, a personalised curriculum for each student, homogenised due to the dataset of the AI, could intrench the belief in society that education does not challenge students. If subjects that students are not interested in are always avoided by the AI, even if they would be important to learn, students would have their views unchallenged and grow complacent with their pre-existing views. Higher education would be expected to be focused on purely fulfilling interests of students rather than being beneficial to the students' future

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[38] Noah Khan. "Critical Race Robots: An Interdisciplinary Approach to Human-AI Interaction in Education." *Philosophy of Education* 80, no. 1 (2024): 45–57.

[39] Audrei Rodrigo Pizolati. "Digital Media, Social Bubbles, Extremism and Challenges Implicated in the Construction of Identity and Respect for Diversity and Cultural Pluralism." *Philosophy International Journal* 7, no. 1 (4 January 2024): 1–9. https://doi.org/10.23880/phij-16000317.

[40] Kristján Kristjánsson. *Flourishing as the Aim of Education: A Neo-Aristotelian View*. 1st ed. Abingdon, Oxon ; New York, NY : Routledge, 2020.: Routledge, 2019. https://doi.org/10.4324/9780429464898.

and society. Such an unchallenging view within education runs the risk of not preparing students sufficiently for the labour market and hindering the capacity of economic productivity. Whilst it may seem strange to argue that it is wrong to simply fulfil the interests of students, what will benefit a student and what a student enjoys learning are often not the same thing.

Homogenised learning, echo-chambers, and the loss of collaborative learning also inhibit the development of personal autonomy and democratic competence. The capacity to make well-informed decisions for oneself is reduced if the information it is based on is one-sided and lacking. Moreover, collaborative learning enhances critical thinking skills, which do not develop equally in its absence.[41] Collaborative learning in classes encourages discussion and re-thinking of ideas, which lacks in individual classes that are furthermore dissimilar in content. Here, epistemic fragmentation complicates discussion and relations with peers even more, since customised content for each student takes away the possibility of sharing epistemic interactions.[42] This can lead to difficulties figuring out if certain content an AI tutor teaches is harmful if the only person that is exposed to the content already agrees with it.[43] Other students that could identify the potential danger of such ideas would simply not witness them and be unable to stop the spread of these harmful ideas. We identify this as a clear inhibitor of the capacities of democratic competence and personal autonomy.

The capacity of personal autonomy is thus heavily based on critical thinking skills, which Laak and colleagues identified as decreasing in the case of heavy use of AI.[44] The personal reasoning needed for critical thinking and consequent autonomous decisions is restricted if the AI tutor does the thinking for the students. Students cannot fully form their own beliefs if everything the AI tells them is taken at face value and accepted without questioning the process behind it. If critical thinking decreases, societal norms would become rigid and moral beliefs would turn black and white. Without questioning traditions or allowing for nuance in moral judgements via critical thinking, societies would become susceptible to propaganda distributed in algorithmic echo-chambers.[45] The use of AI itself and its side effects

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[41] Marjan Laal and Seyed Mohammad Ghodsi, "Benefits of Collaborative Learning."
[42] Silvia Milano and Carina Prunkl. "Algorithmic Profiling as a Source of Hermeneutical Injustice." *Philosophical Studies* 182, no. 1 (January 2025): 185–203. https://doi.org/10.1007/s11098-023-02095-2.
[43] Milano et al, "Epistemic Fragmentation Poses a Threat to the Governance of Online Targeting."
[44] Kristjan-Juluis Laak, Rania Abdelghani, and Jaan Aru. "Personalisation Is Not Guaranteed."
[45] Audrei Rodrigo Pizolati, "Digital Media, Social Bubbles, Extremism."

like homogenised learning, creation of echo-chambers, epistemic fragmentation, and loss of collaborative learning thus inhibit the development of critical thinking, needed for both the capacities of personal autonomy and democratic competence. Due to this, it is crucial to mitigate these risks.

3.3 Recommendations

To prevent the risks of homogenisation, higher education should be clearly driven by the goal of benefitting its students, even at the cost of adding a subject to the curriculum that forcefully confronts them with ethics or sustainability, for example. Prioritising the total personalisation and enjoyment of a study can be counteractive to achieving the aims of education. Therefore, we propose that universities put a limit on the degree of personalisation possible for students. Certain points and subjects should be deeply ingrained in the curriculum and taught regardless of the direction of study of a student. Shared, fixed classes in a curriculum also help decrease epistemic fragmentation, since it allows for shared knowledge and experiences with peers.

This would also aid in reducing the chances of forming echo-chambers. The extent of personalisation could be limited by ensuring that they are exposed to ideas and information outside their sphere of interest. This however is not the only solution. It could also be effective to make sure that the AI itself always ensures that when learning about a certain topic, such as politics for instance, that the learning profile built for a student is broader than a few specific viewpoints. If this strategy were employed, all students have the possibility of receiving fully personalised learning tracks and less probability of being taught in an echo-chamber.

The degree of personalisation also determines how much collaborative learning is possible. In the scenario where full personalisation is taking place, the different courses students take would impede collaborative learning. We again propose limited personalised learning, building on an idea of Milano and colleagues concerning personalised ads.[46] They offer an option to mitigate the effects of targeted ads by only allowing a certain percentage of ads to be personalised. Similarly, a percentage of courses could not be personalised and

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[46] Silvia Milano et al, "Epistemic Fragmentation of Online Targeting."

include collaborative learning and a prescribed curriculum to prevent homogenisation and allow for shared experiences with peers.

A highly speculative approach to enhance collaborative learning and keep a high degree of personalisation would be introducing AI-generated peers to a student's personalised curriculum. It is unclear if social aspects would be replaceable, or critical thinking would be fostered with AI-generated peers. However, the option remains for future development of AI.

The study conducted by Laak and colleagues concluded that AI-driven PL can only achieve its best results if learners develop sufficient critical thinking skills before relying on AI tools.[47] However, this report is future-oriented, so we propose that in time for our scenario in 2040, AI teaching systems might have developed to stimulate critical thinking. Instead of telling information to the student mechanically, it can know when to withhold information and encourage critical thinking. We also propose that constant fact-checking of the AI systems will significantly decrease due to higher accuracy.

To achieve a future where AI does not damage the ability of students to think critically, the creators and programmers of the AI system must engineer their AIs to not only narrate information and encourage memorising but prompt the students to question the process behind knowledge acquisition and the information shared. AI can only be said to effectively augment PL if it is capable of conveying knowledge, but also teaches students to analyse, evaluate, and interpret information logically to make reasoned judgments and decisions. Otherwise, the ability for higher education to provide students with programs that achieve the goals of education, such as personal autonomy and democratic competence, will become reduced.

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[47] Kristjan-Juluis Laak, Rania Abdelghani, and Jaan Aru. "Personalisation Is Not Guaranteed."

Effects of AI-Driven PL on Students

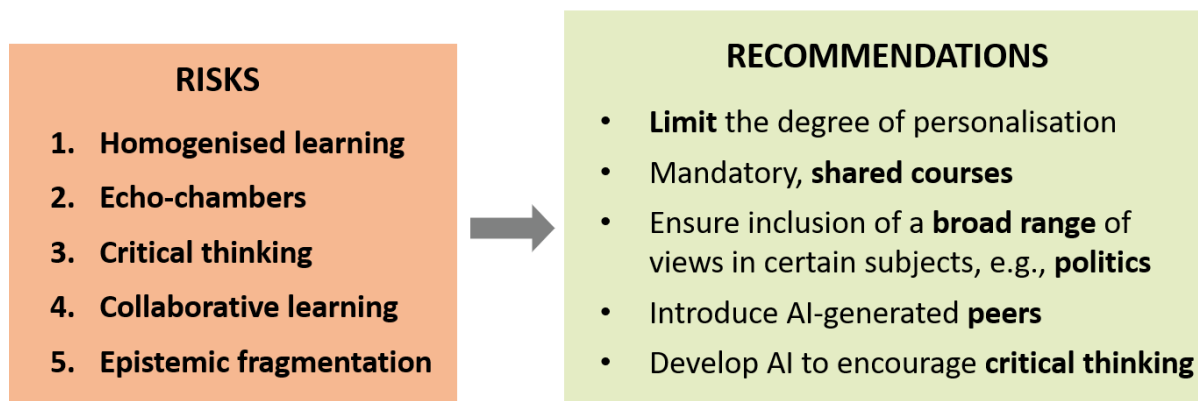| RISKS	RECOMMENDATIONS
1. **Homogenised learning** 2. **Echo-chambers** 3. **Critical thinking** 4. **Collaborative learning** 5. **Epistemic fragmentation**	• **Limit** the degree of personalisation • Mandatory, **shared courses** • Ensure inclusion of a **broad range** of views in certain subjects, e.g., **politics** • Introduce AI-generated **peers** • Develop AI to encourage **critical thinking**

Figure 5: Summary of the risks of AI-driven PL on students and recommendations to minimise them.

4   The Unintended Effects of AI-driven PL on the Education Sector

In 2040, educational institutions rely on private AI companies to supply the necessary technology for personalised education. Thus, they collect large amounts of personal data from their students, requiring both a data and monetary cost from students. The data is used by private companies to improve their algorithms and increase profit. They have minimized the number of human teachers, limiting them to a supporting role. Since AI technologies are privately owned, better quality of education is partly dependent on the money paid for it.

Personalised education will likely have numerous effects on the education sector, both positive and negative. This section will explore the potential negatives by diving into the risks associated with personalised education in relation to the education sector. First the risks will be discussed, followed by looking deeply into why they are risks and this will be followed by a look into possible mitigation strategies or steps that can be taken in order ensure that the risks are properly planned for.

4.1   What are the Risks?

One of the risks that tends to follow whenever a new market is created is a **capitalist takeover.** This may occur because universities themselves will likely not have the ability to create the AI systems needed for personalisation themselves, resulting in higher education having to rely on private companies. The large costs associated with developing, maintaining, and creating AI systems is currently not something that a university or a collection of universities could do.[48] Because of this, the development and maintenance of these AI systems will likely fall

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Risks for the Education Sector:
(1) Capitalist takeover
(2) Privacy issues
(3) Equality
(4) Role of the teacher

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within the private sector, with either AI companies or companies specialised in educational AI systems taking up that role, as is currently the case. This opens dangers for students, society, and the education sector regarding how these AI system function and what the priorities of the systems are. Whilst universities would want the systems to focus on providing the most well-rounded and fruitful educational experiences possible, there is a chance that other unwanted goals and values might creep in. This would be similar to what currently is occurring within academic publishing, where researchers and universities bear the costs whilst publishers make large profits, of which a negligible amount is seen by universities and researchers.[49] This has ultimately undermined some of the values associated with research and academia, in favour of profits. A similar situation may occur with AI-driven PL if private companies are given or obtain too much power over the product and market.

Not all risks that fall within the education sector however are related to the content, form, and quality of education. **Privacy issues** may appear due to the massive amounts of data AI systems require. The higher the amount of training data, the better the results, hence why so many large language models, such as Open AI's ChatGPT, are trained on as much

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[48] Katharina Buchholz. "The Extreme Cost of Training AI Models." Forbes. 23rd August 2024. https://www.forbes.com/sites/katharinabuchholz/2024/08/23/the-extreme-cost-of-training-ai-models/.
[49] Lucy Montgomery, Emilia C. Bell, Karl Huang. "Academic publishing is a multibillion-dollar industry. It's not always good for science." The Conversation. 24th March, 2025. https://theconversation.com/academic-publishing-is-a-multibillion-dollar-industry-its-not-always-good-for-science-250056.

information obtained online as possible, even if the legality of it turns blurry.[50] In the case of AI-driven PL, a massive amount of data will be needed for the AI to create courses, including personal data from and about potential students. The more data the AI can collect about the student whilst teaching, the more personalised the results it will be able to deliver as a teacher. Here there is room for privacy risks, concerning the storage and use of personal student data, despite being used for educational purposes. Privacy, however, is not something that is set is stone but is context dependent.[51] This means that whilst an AI might need a lot of personal information to create an education path for a student, if the students freely give it and understand the trade-off, it cannot be said their privacy is being infringed upon. This has the potential of changing the way we view privacy as a society if it becomes acceptable to share large amounts of private data and information in exchange for quality education.

Furthermore, the risks depend on the way data for PL would be obtained. One way to obtain it would be an in-depth questionnaire to be filled out by students or engaging in a dialogue with the AI system where it asks for the needed information. However, the truth might be much more invasive, with companies collecting data about all aspects of a student's life and from all their devices and social media. A more expansive approach would be collecting data on students throughout their high school years in order to help build the best courses possible for them, should they pursue higher education. This approach, whilst more invasive and targeting minors in schools, would potentially yield better results in PL despite the ethical problems it would pose.

Another potential issue is the decrease of **equality** within the education sector. As mentioned, developing, maintaining, and running AI services is currently an expensive endeavour, both due to the amount of power required to run these services but also due to the equipment required. Whilst this cost is currently decreasing year by year, as more efficient hardware is developed and the AIs themselves become more optimised, it is unknown how much the costs will decrease and whether current rates might plateau. The large costs could cause issues if competing companies offer different prices and their AIs provide results that correlate with their pricing. We would see different institutions within higher education offer

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[50] Veronika Samborska. "Scaling up: how increasing inputs has made artificial intelligence more capable." Our World in Data. 20th January, 2025. https://ourworldindata.org/scaling-up-ai#:~:text=The%20idea%20is%20simple%20but,better%20performance%20across%20many%20tasks.

[51] Helen Nissenbaum. "Privacy as Contextual Integrity" *Washington Law* Review 79, no 1 (2004): 136-140. https://digitalcommons.law.uw.edu/wlr/vol79/iss1/10/

different quality courses simply due to financial constraints. This would embed within the education industry a capitalistic approach where those who cannot afford to spend as much on their education get an inferior product simply because they cannot afford it.

With a changing education system, there could also be potentially harmful effects regarding the **role of the teacher**. These effects and changes would depend on the degree of personalisation happening in higher education. If AI is only used to change the form of education or merely as a content creation aid, it can be seen as a helper and a tool for the teacher, who, apart from working more efficiently, would occupy a very similar role. However, concerning our scenario, if AI could take over teaching as well as generate entire personalised courses for each student, the role of the teacher would change drastically. It could even mean that having human teachers in higher education becomes a thing of the past. A teacher acting as the source of knowledge for students would be taken over by the AI tutor. Assessments could also be handled by an AI system. Consequently, we expect teachers to grow more into their role of guiding students, helping students figure out their goals and motivations and what they want to pursue. Moreover, teachers could be the ones teaching students how to properly use AI, if that does not happen in previous education.

4.2   Why are they Risks?

Starting with the risks that would emerge from a **capitalist takeover,** the resulting influence from private companies could compromise the traditional goals of education. This would mean that developing the capacities Brighouse and colleagues identified would only be important if it is profitable for the companies producing the AIs. This would potentially turn the education industry into a marketplace, driven by profit incentives rather than results, ultimately undermining higher education itself. Here another problem arises because public funds and resources that are given to universities would be used to fuel profits for private corporations who might not even be providing universities with tools that make the expenditure worthwhile.

Furthermore, if AI systems are largely self-sufficient, there is a chance that the systems themselves might infringe upon higher education by, for example, having private companies offer their own courses created and run by AI. This could further reinforce profit incentives that negatively impact the educational standards in favour of more profitable models,

negatively impacting the entire education sector by creating competition that is not based on the goods of education. This could ultimately undermine what education is meant to achieve in the first place, where AI would be responsible for turning higher education into a for-profit enterprise rather than helping higher education become a better version of what it is now.

A not as drastic but also significant change in the education sector would be the immense data collection and related **privacy issues**. Pursuing higher education could become more complicated than just choosing to pursue an education, as potential students may have to consider whether they want to share large amounts of their data to pursue their goals. If higher education becomes fully personalised, this will be a new barrier to entry for everyone. If AI-driven education becomes the new normal, it would give companies freedom in their data usage, as potential students would no longer be able to simply pursue other avenues. This problem becomes compounded if data is collected in students' school years as well. Not knowing if the students will enter higher education in the future and collecting data just in case gives space for privacy questions to be addressed in future laws.

Even if students are aware of the data collection and consent to it, it can still negatively impact educational goals. The capacity for personal autonomy is fostered by students expressing themselves and entering discussions; they need to not shy away from forming, sharing, and revising opinions and ideas. With the knowledge that everything is recorded in data, students can be less willing to do so. Similarly, democratic competence is learned in open debates and critical discussion, which are at risk of disappearing if students know their every word is tracked.

Furthermore, even though students are aware data is collected, they are unaware of the conclusions the AI forms based on their data. For example, an AI tutor could conclude from data collection that a student is depressed and alter classes accordingly. Whilst the altered classes might help fighting symptoms of depression, the student might not actually want the AI knowing of their mental health and therefore not mention it, unaware that the AI has already gained the knowledge based on other data. This could open the possibility of private companies obtaining information that normally would be only known to friends and family. If sensitive information could be linked to the student in other spheres, such as the labour market, the capacity of economic productivity could also be compromised. Moreover, an AI company or potential employer knowing information about students without them knowing they have this information infringes on autonomy of the student. They did not choose

that the information to be known by anyone else, but their autonomous decision was not respected.

Another educational goal that is not respected, but potentially discarded is the capacity to treat others as equal. In relation to the risk of reduced educational **equality**, if some educational institutions cannot raise the needed funds to switch to AI-driven PL, but others do, they could find themselves stuck in what may be seen as an outdated method of education. The price of education would change accordingly, with some institutions being able to buy the best AI system due to their higher tuition fees. Students in AI-driven universities would not interact with students of lower income classes that cannot afford AI-based PL, or only a weaker system. Consequently, social divides would increase and encourage classist thinking, which is not compatible with treating others as equal.

Another harm to equality is algorithmic unfairness, which disproportionately affects marginalised groups. The historical data that AI systems are trained on are often biased by the same prejudices that societies have and thus entrench inequalities.[52] If a student's data suggests they belong to a social group that is stereotyped to be less intelligent, an AI system used in PL might design their curriculum less intensive and limited, driven by the prejudiced data that claims they are incapable of learning more. Furthermore, whilst this report will not cover this aspect as it is outside its scope, global inequalities in educational standards will likely worsen as nations in poorer regions of the world may not be able to afford or even have the infrastructure required to utilise AI-driven PL.

A change in the **role of teacher** can run the risk of making the educational sector devoid of moral role models. As Brighouse and colleagues emphasise, the ability to form healthy personal relationships, ascribe others equal moral worth, and personal fulfilment are as important as intellectual abilities.[53] Currently, teachers are not just educators, but also agents that foster certain virtuous behaviours.[54] If AI tutors take over, this role will be empty. AI tutors lack the ability to teach the human experience and human flourishing because they are not human.

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[52] Gloria Origgi and Serena Ciranna. "Epistemic Injustice." In *The Case of Digital Environments*, 1st ed. Routledge, 2017.

[53] Brighouse et al, "Educational Goods and Values."

[54] Kristjánsson, "*Flourishing as the Aim of Education*"

If human teachers do not keep their role as the primary educators in higher education, we envision a shift in morality and societal beliefs will follow. Emotional intelligence will decline, since teachers cannot teach it anymore, leading to more individualistic and transactional practices. Students may fail to develop human connections and understand their moral responsibilities towards others if they cannot learn so from a mentor.

4.3 Recommendations

Higher education is currently regulated by bodies that investigate and verify whether the institutions themselves and the courses they offer meet the criteria to be accredited. This system would need to be expanded if AI programs can design entire educational tracks. The amount of information would be far too much for bodies of the current size to handle, and likely impossible for humans to verify. Whether this entails designing an AI that can do some of the verification work or developing a system that accurately manages to curate what content the AI can choose to create or teach, the governing bodies around education will need to adapt to preserve the quality of higher education.

Furthermore, to ensure privacy is preserved within higher education, steps would also need to be taken. For the scenario where personalised education takes the form of individuals taking questionnaires and being put in dialogue with an AI to figure out the best way forward, privacy will not be infringed upon if the students give consent. But if data about students and their preferences are collected from as many sources as possible, privacy may be infringed upon. However, the biggest issue would be the handling of the data. The data collected from students will be extremely valuable to AI companies and will also be valuable to advertising companies as well. Consequently, there would be interest to offer their products only under the condition that they can also use the data collected from students as they please. This could be a problem on multiple fronts, especially if students do not understand what they are signing up for. Due to this, transparency should be a goal when implementing these systems so that everyone understands what exactly is happening with their data and what it will be used for. Alongside this, the education sector itself and the government should implement strict regulations for how the data may or may not be used and what data can be collected in the first place to reduce the chance that students have their privacy infringed upon.

Lastly, to ensure that AI-driven PL does not become a service only accessible to those capable of affording it, steps will likely have to be taken on both the government level and within the education sector. On the government level it may be possible to subsidise institutions that cannot fully afford to upgrade to AI-driven personalised learning so that no institutions can benefit from simply having a better financial position and raise prices. However, this will depend greatly on the government in place, and with the current direction in the Netherlands this may be difficult. On the level of the education sector, it may be possible for universities to agree to slowly roll out personalised learning programs at the same rate or simply refuse high prices offered by AI companies as a collective in order to ensure that some institutions are not left behind. However, this may also be an impossible task as it would require full cooperation, and some institutions may have strong reasons to become early adopters of AI-driven PL. Nonetheless, the financial implications for students and for the education sector should be considered when looking at the adoption of AI driven PL to avoid the education sector contributing to existing inequalities.

The solutions to the risks we envision show a strong need for limiting the degree of personalisation within higher education. Teachers could be responsible for teaching courses with prescribed, non-personalised content. This would encourage collaborative learning, critical thinking, and teach necessary content to avoid echo chambers and homogenisation. If AI-driven PL enables more people to enter higher education, as we expect, then these classes would most probably add up to a similar workload as teachers currently have. This continuing demand for teachers allows them to keep their jobs. We strongly support human teachers staying employed and in contact with students due to their role in upholding goods of education.

Effects of AI-Driven PL on the Education Sector

RISKS

1. **Capitalist takeover**
2. **Privacy issues**
3. **Inequality**
4. **Role for the teacher**

RECOMMENDATIONS

- Adapt education **verification** process
- **Transparency** of AI systems
- Strict data **privacy regulations**
- **Cooperation** & regulation of **financial** issues
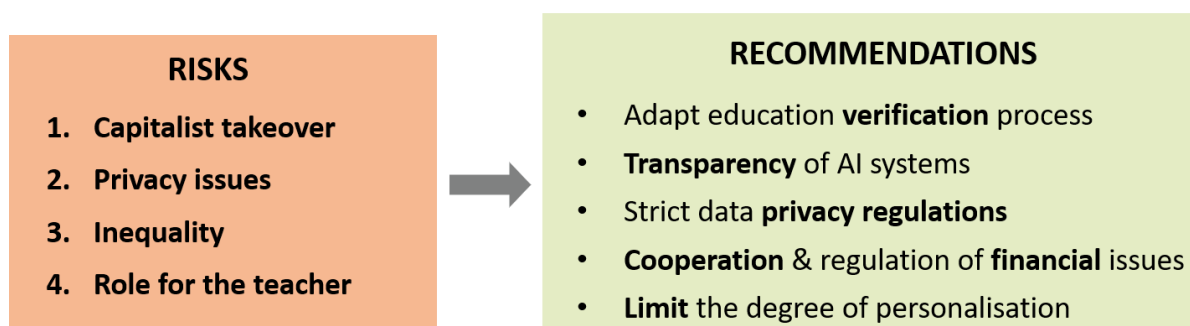- **Limit** the degree of personalisation

Figure 6: Summary of the risks of AI-driven PL on the educational sector and recommendations to minimise them.

5 The Unintended Effects of AI-driven PL on Society

In 2040, due to the changes in higher education brought on by the introduction of AI-driven PL, some parts of society have changed for the worse. Democratic countries especially have started to suffer due to higher education producing citizens unfit for roles in government. Furthermore, voting and legislative processes have begun to grind to halt, brought on by people struggling to work together and with those who share differing views.

5.1 What are the Risks?

For democracy to function correctly, the citizens that constitute a democracy must be knowledgeable enough and educated enough to make well-informed decisions and carry out the needs of the democracy.[55] This is best done by making education accessible to all, so that everyone is given equal opportunity to become educated. This is already done in most countries, and in the Netherlands, education is compulsory until the age of 16.[56] However, higher level education also plays a role in allowing democracy to function, as it

Risks for Society:
(1) Ineffective democracy
(2) Environmental dangers

allows citizens to develop their knowledge and skills whilst developing the critical thinking required to assume necessary roles required for society, democracy, and governments to function. Furthermore, critical thinking and a strong, broad knowledge base are vital when it comes to decisions such as voting in a democracy, as it ensures those who vote come to their own conclusions and are not swayed by propaganda and irrelevant factors.

Personalising higher education may however have a negative impact on the functioning of democracy, due to limiting the extent to which individuals can develop

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[55] John Dewey, and Patricia H. Hinchey. *Democracy and Education by John Dewey: With a Critical Introduction by Patricia H. Hinchey*. Bloomfield, United States: Myers Education Press, 2018. 45 http://ebookcentral.proquest.com/lib/uunl/detail.action?docID=5377970.
[56] City of Amsterdam. "Compulsory education." Last accessed 3rd of April 2025. https://www.amsterdam.nl/en/education/compulsory-education/#:~:text=In%20the%20Netherlands%2C%20school%20attendance,basic%20qualification%20before%20leaving%20school.

themselves cognitively to the extent required for a democracy to function well. As discussed in previous sections, this could occur if personalisation is allowed to grow to the extreme, where individuals choose exactly what they want to learn and thus are not exposed to knowledge and information that would broaden their thinking and ability to reason.

Furthermore, another societal and global risk is the ecological footprint of AIs due to the large amount of electricity and resources they require. Whilst this risk is not related to education itself, it needs to be taken into consideration, as it adds another cost to both attending and facilitating higher education. With the development of AI technologies and their increased use in higher education, the needed infrastructure to employ them will also increase. Furthermore, if technologies, such as 3D avatars of teachers or extended reality, become a large part of higher education, students and universities will have to equip themselves with the necessary tools to properly facilitate these developments, all of which will have an ecological cost and impact on the environment and society.

5.2   Why are they Risks?

An education system that fails to foster sufficient cognitive development would be an issue because being exposed to and being capable of engaging with a broad set of views is an important aspect of participating within a democracy effectively.[57] Currently many higher education programs contain mandatory courses in fields such as ethics or philosophy because these courses benefit students and enhance their ability to think critically in a broader sense whilst also exposing them to the views of others. Allowing these types of courses to take a backseat in situations where students do not want to spend time or energy on them could have a negative impact on the functioning of society and the ability for democracy to flourish.

As for the risks associated with the ecological footprint that may follow an increased usage of AI for education purposes, in a world that is currently starting to feel the effects of human induced climate change, adding to that burden is an issue. Furthermore, many universities globally have already taken initiatives to become more eco-friendly, something that sets an example for the wider world and helps reinforce how serious the problem of climate change is. To start to adopt new technology that may reduce previous efforts to being

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[57] Harry C. Boyte, and Marie-Louise Ström. "Agency in an AI Avalanche: Education for Citizen Empowerment." *Eidos 4, no. 2 (2020):*144. https://www.academia.edu/43834743/Boyte_and_Strom_Agency_in_an_AI_Avalanche_Eidos_2020.

more eco-friendly would erode trust in these institutions as credible sources when it comes to climate change but directly and indirectly harm the world.

5.3 Recommendations

To avoid students following a curriculum that fails to sufficiently allow for intellectual growth in higher education, measures can be put in place that limit the extent of personalisation that is possible. This would mean that whilst complete personalisation is no longer possible in all circumstances, students are pushed to take courses which will build competency as participants within a democracy. This will occur by exposing them to new knowledge whilst broadening their perspectives and critical thinking skills. This would put safeguards in place that ensures students gain everything they can from their education which would then translate into the political sphere.

Another benefit of limiting the amount of personalisation would be that the ecological footprint associated with personalisation would be reduced. However, strategies for reducing the ecological footprint itself are much more difficult. Universities could set standards for energy efficiency and other metrics for AI's that need to be met before they are used but there will always be a footprint and how much this can be reduced below industry standards is unclear. Furthermore, to simply say no to using personalised education driven by AI is not a suitable answer as that does not mitigate risk but rather removes personalisation all together alongside the risks in its entirety. In order to ensure that personalised education does not become a contributing factor to the ecological problems currently facing the planet, the education sector and universities should carefully consider the trade-offs associated with AI-driven PL.
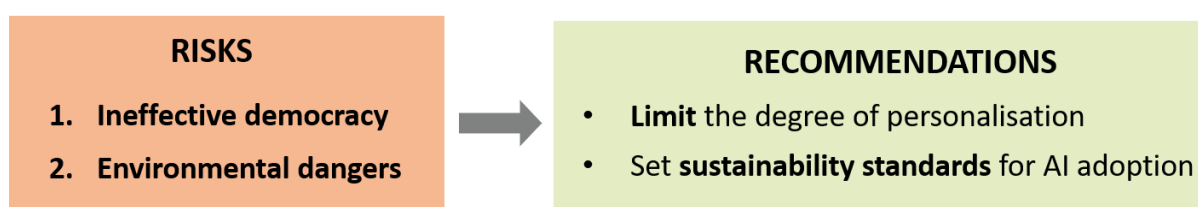
Effects of AI-Driven PL on Society

RISKS		RECOMMENDATIONS
1. **Ineffective democracy**	→	• **Limit** the degree of personalisation
2. **Environmental dangers**		• Set **sustainability standards** for AI adoption

Figure 7: Summary of the risks of AI-driven PL on society and recommendations to minimise them.
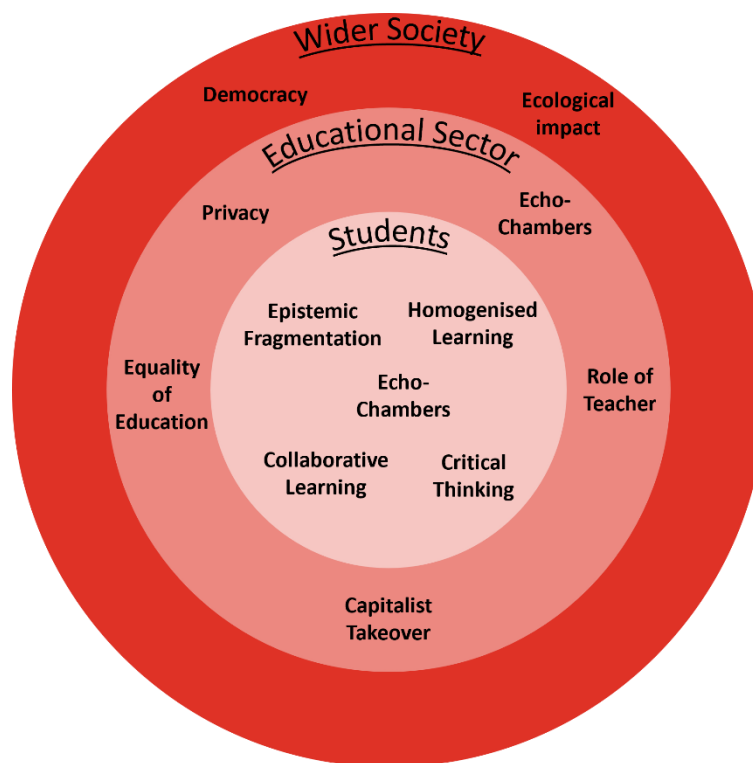
6   The Big Picture

Figure 8: The risks of AI-driven PL visualised in the three spheres of impact.

This report has covered three spheres of influence to create a cautionary tale of what should be avoided if higher education decides to utilise artificial intelligence to personalise education for students. Whilst for the most part these spheres have been covered separately, they all interact and reinforce the cycle of techno-moral change. As shown in the graphic above, all three spheres that have been discussed so far fall within one wider whole, this section will cover how the different spheres interact with one another to demonstrate how exactly they influence on another. The knock-on effect that the spheres have on each other demonstrates how vital education is in the first place and how far reaching the effects of quality education are.

Starting from the bottom up, effects on the student level show that the ramifications of negatively impacting the experiences and growth of students has effects that span to the global sphere. A student body that experiences a less fruitful educational experience, even if

they enjoyed it, can have impacts on the very functioning of democracy itself. Whilst the cognitive implications may seem to mainly effect the students, society feels the wider effects too. Here, potentially only long after the students have graduated will the effects be felt when the generation of AI-led students begin to enter government and assume important positions in society. These changes in students' capacities and their learning experience set in motion moral and societal transformations.

Changes in student cognition, especially reduced critical thinking skills, leads to a society that stops questioning educational content. This alters beliefs and attitudes in other spheres of life. Habits of passive learning and reliance on algorithmic decision-making will reflect in the positions students enter and promote the view they have of education. The educational goods we highlighted in this report would change to different ones, pertaining especially to fulfilling interests and minimising the workload for students.

These effects on society could in turn also effect the education industry and students for better or for worse. Whilst speculating on these secondary effects is beyond the scope of this paper, these effects could take the shape of reverting changes to higher education in favour of more traditional models that do not include personalisation. This would affect the education sector as a whole, as many of the issues associated with personalisation would suddenly disappear in regard to privacy and echo-chambers, which in turn would also affect students once again.

Techno-moral change is not one-directional, however. The risks mentioned in the education sector cause changes in student practices and beliefs, which affects both the student sphere and the global sphere simultaneously. The effects on privacy within the education sector may have more global implications for how society views privacy, framing the collection of data as a needed aspect of proper education instead of a possibly unwanted side-effect. Especially the failure to address echo-chambers within the education sector would negatively impact students and democracy simultaneously, since it has the potential to shape the way people perceive their own views as correct even if they are not logical. Such changes could produce a morality where the questioning of other's views is seen as worse than the absence of openness, curiosity, and tolerance.

The big picture is important to consider because all the risks associated with personalised learning are interrelated and embedded in a broader landscape of potential techno-moral change. Shifts in education due to AI technology thus led to societal and ethical

shifts that reinforce each other in complex and sometimes unpredictable ways. This means that if the risks are to be properly addressed, they must all be addressed to some extent otherwise the risks that are not mitigated may cause even more issues than originally anticipated. Whilst this does not entail an out-of-control spiral, to underestimate the consequences of changing the model of higher education could have very broad and serious consequences if not done correctly and with a risk conscious drive.

7   Limitations

The limitations of this report are most evident in its speculative nature. Although our future scenario is based on current knowledge, the future is always unsure. We did not calculate for a sudden dramatic technological change or catastrophe that makes our report incomplete. However, unpredictable change cannot be studied or predicted in virtue of being unpredictable. Therefore, we focused on future predictions based on current trends and extrapolated the current use of AI and PL.

This report focused on higher education; thus, it does not take into account non-autonomous students of primary or secondary education. A different report focusing on the risks AI-driven PL poses for younger students would be needed to dive into the dimensions of the risks that are different for minors.

8   Conclusion

AI-driven PL within higher education is a promising next step when it comes to providing both individuals with the ability to attend higher education and providing more options for potential students when it comes to the shape their education takes. However, it also comes with many associated risks if it is not approached correctly. This report has outlined these risks, why they occur, and provided insights into how they could be avoided. It presented these risks in three main spheres, namely the students that will be affected, the education sector and the societal impact of AI-driven PL. Whilst the potential problems range from undermining the effectiveness of democracy and the creation of echo-chambers, to the transformed role of the teacher, most of the potential issues depend on the extent to which education is personalised. However, this does not imply that personalisation itself is bad, rather that the process is not straightforward and needs to take many other aspects into consideration

alongside the wants and needs of students and whether personalisation allows knowledge to be imparted more effectively.

For education to preserve its core goods and to maintain its core values and goals, such as creating broad-minded critical thinkers capable of taking multiple views and perspectives into account, steps must be taken. This means that if AI-driven PL is pursued, measures must be taken to ensure not just that the quality of education remains the same, but the goods associated with education are preserved. This can be done either through changing how the personalisation process functions, the extent of personalisation allowed or by implementing new aspects in higher education that make up for values, goals and goods lost through the personalisation process. Whilst the actual steps that should be taken are more nuanced, many potential problems stem from similar aspects of the personalisation process and these broad problems should likely form the core focus when it comes to minimising the risks associated with personalised learning in higher education.

Despite these concerns, if done properly, AI-driven PL has a chance to change the landscape of higher education for the better. Whether AI develops to the point where it can generate personalised courses and teach them effectively will ultimately be the main challenge. However, even if full personalisation does not come to fruition, AI will likely be able to aid in personalising education to a limited degree when it comes to both form and content.

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