



JUNE 2024 | ISSUE 12

Skills Development in the Era of AI

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EDITORIAL

As we head into summer, we bring you the latest edition of the Skills4Dev Knowledge Digest. In this issue, we explore the promising potential of AI in personalized learning and skills development. Dive in to discover insights and expand your understanding of this topic.

The rise of artificial intelligence (AI) has brought about a new era of potential for skills development. [UNESCO's 2021 report](#) on AI in education provides a comprehensive overview of the topic, highlighting both the promise and the challenges of leveraging AI technologies to improve learning outcomes. One of the key areas of focus is the use of [chatbots in education](#), which have shown great potential for personalized learning and support. To fully realize the potential of AI, [teachers will need to improve digital competencies](#) and effectively integrate AI tools into their practice.

AI's ability to enable personalized learning at scale is one of its greatest contributions to skills development. Adaptive technologies have [improved math outcomes for high school students](#) by continuously assessing performance and adapting content. AI-powered tutoring software has also [delivered effective and cost-efficient math tutoring](#), with benefits similar to in-person models. In higher education, personalized learning software has remediated math skills, [reducing course repetition and improving test scores](#). These examples show how AI can tailor learning to individual needs, enhancing equity and outcomes.

As AI becomes more integrated into skills development, there are concerns about the [potential erosion of skill premiums](#). Research in [software development](#), [customer support](#), and [consulting](#) has shown that AI assistance can have a leveling effect, with a greater impact for those lower in the skills distribution. This raises questions about the long-term value of certain skills in an increasingly automated workforce, leading to changes in the nature of work and potentially exacerbating growing inequalities between labor and capital. While [historical analysis](#) suggests that automation (including AI) could lead to a decrease in the premium for certain skills, other models offer [a more optimistic view](#), suggesting that new opportunities for skills development could emerge.

The key to navigating this landscape will be to ensure that AI is used in a way that [complements human skills](#) rather than replacing them. While AI holds great potential for skills development, research suggests that its implementation must be carefully considered to avoid potential drawbacks, such as [decreased student engagement](#). This will require a concerted effort from educators, policymakers, and industry leaders to develop strategies for AI-driven skills development that prioritize equity, inclusion, and active learning. By doing so, we can harness the power of AI to build a more resilient and adaptable workforce for the future while mitigating risks to motivation and participation.

We would like to hear from you! Please send us your ideas, suggestions, questions, or collaboration opportunities at skillsgsg@worldbankgroup.org. Learn more about what the GSG can do for you at the end of this digest.

Happy Reading!

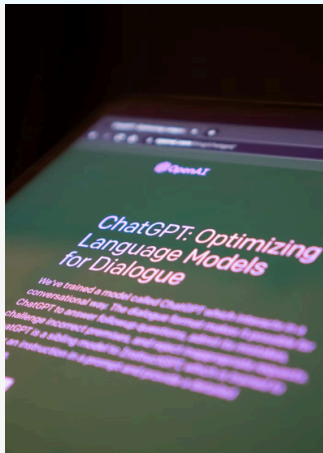
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FEATURED WORKS ON AI FOR SKILLS DEVELOPMENT



[Artificial Intelligence and the Skill Premium](#)

Bloom, D. et al. | Working Paper | 2024 | Global

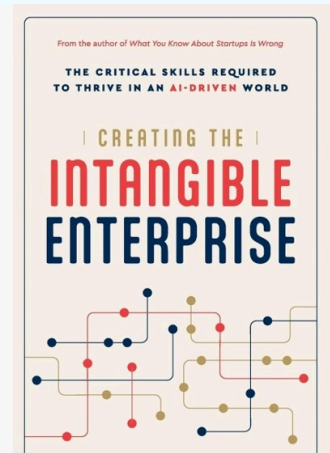
The paper investigates how **AI may impact the wage gap between high-skilled and low-skilled workers**. It uses a production function model that considers traditional capital, industrial robots, and AI. The model assumes robots replace low-skilled workers, while AI assists high-skilled workers. The authors find that **AI reduces the wage gap if it substitutes more for high-skilled labor than low-skilled labor does**.



[AI Won't Eat Your Job, but It Will Eat Your Salary](#)

Sangeet Choudary | Blog | 2024 | Global

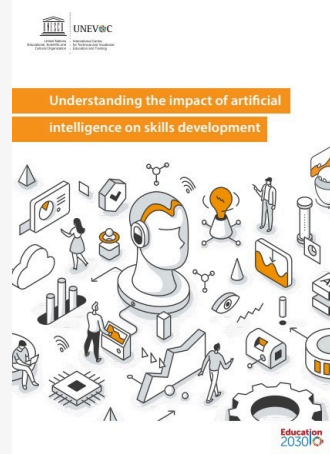
This industry blog post, written from the perspective of today's well-paid knowledge workers, discusses the organizational dynamics that can erode the skills premium in practice. It argues that AI's primary impact will be this erosion in skill premium vs. replacement of entire jobs because **AI will disrupt the task bundles that make up jobs, often commoditizing specialized tasks and the learning advantages of experts**. As AI absorbs skills and knowledge, it will accelerate commoditization, making it harder for workers to command a premium.



[Creating the Intangible Enterprise: The Critical Skills Required to Thrive in an AI-Driven World](#)

KP Reddy | Book | 2024 | Global

The book explains how **AI will change the business landscape**, emphasizing that intangible human skills like **creativity, adaptability, and leadership will drive growth**. It provides a playbook for succeeding in the AI age, including deeply understanding customers, emphasizing factors like perception and reputation, and promoting ethical decision-making and problem-solving. The author stresses that leaders who focus on human-centered skills will succeed in an uncertain future with evolving AI applications.



[Understanding the Impact of Artificial Intelligence on Skills Development.](#) [Education 2030](#)

UNESCO | Report | 2023 |
Global

The report explores **the impact of artificial intelligence (AI)** on teaching, learning, labor markets, and workplaces, **with significant implications for technical and vocational education and training (TVET)**. While AI is already integrated into some TVET systems, many institutions have yet to develop robust responses to these technological shifts. The report emphasizes that to thrive in the AI era, TVET institutions must understand AI's current and future importance and proactively incorporate its use into their planning. Forward-thinking action will position TVET and its graduates to contribute positively to economic, social, and individual development.



[The Turing Transformation: Artificial Intelligence, Intelligence Augmentation, and Skill Premiums](#)

Agarwal, A. et al. | Working Paper
| 2023 | Global

The paper argues that task automation, especially driven by AI, can enhance job prospects and potentially widen employment scope for many workers, contradicting concerns about negative job and inequality outcomes. The authors highlight **the potential for AI automation to improve the value of many workers' skills, expand the available worker pool, increase labor income, and reduce inequality, which they call the "Turing Transformation."** They suggest AI researchers and policymakers should focus on AI research outcomes rather than whether applications automate human-performed tasks. The paper concludes that automation's distributional effects depend more on which workers' tasks get automated than on automation itself.

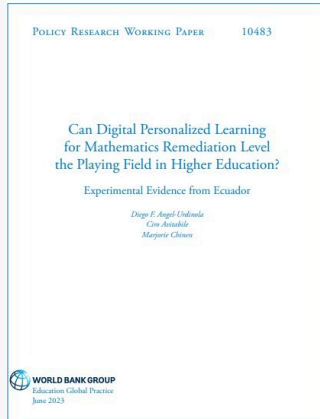


[Tasks, Automation, and the Rise in US Wage Inequality](#)

Acemoglu & Restrepo | Working Paper | 2021 | USA

The paper documents that 50-70% of changes in the US wage structure over the last four decades are due to the relative wage declines of workers specializing in routine tasks in rapidly automating industries. The authors develop a framework showing how automation displaces certain workers from tasks where they have comparative advantage, leading to wage changes. They find robust evidence supporting this relationship and show that task displacement explains much of the changes in education differentials between 1980 and 2016. The paper concludes that automation technologies have driven US wage inequality, with modest productivity gains accompanying major inequality changes.

WHAT'S BREWING AT THE WBG?



[Can Digital Personalized Learning for Mathematics Remediation Level the Playing Field in Higher Education?](#) Angel-Urdinola and Chinen | Working Paper | 2023 | Ecuador

The study assessed the impact of a **digital personalized learning software (ALEKS) on math remediation for first-year students in Ecuadorian higher education programs during the COVID-19 pandemic**. Offering the software led to a significant decline in course repetition and a large positive impact on math test scores, with particularly large effects for male students. The analysis suggests that the software increased the time students spent studying math. The results indicate that **such digital personalized learning tools can be a cost-effective solution for math remediation with potential for large-scale implementation**.



[Teachers and Technology— Together— Improve Student Learning](#) D'Angelo, S. et al. | Blog | 2023 | Dominican Republic

The blog discusses the implementation of *Prográmate*, an **adaptive technology platform, in public high schools in the Dominican Republic to improve math learning**. The platform helped identify strengths and weaknesses, motivating both teachers and students. Despite inadequate technology infrastructure and varying teacher digital competencies, **the program demonstrated adaptive technology's potential in public education**. The blog emphasizes the importance of teacher support and buy-in, as **students preferred learning with teachers alongside technology rather than technology alone**.



[Implementing Adaptive Learning Programs: Lessons from the EdTech Hub](#) Barón, J. et al. | Podcast | 2023 | Ecuador and Dominican Republic

The podcast discusses adaptive, personalized learning, featuring insights from the EdTech Hub and the World Bank's experience implementing adaptive learning software in Ecuador and the Dominican Republic. **Experts share lessons on gaining political will, accessing technology, and successful implementation**. The conversation highlights the collaborative research efforts of the EdTech Hub, a joint initiative of the World Bank, UNICEF, and the Bill and Melinda Gates Foundation.

[Navigating the Jagged Technological Frontier: Field Experimental Evidence of the Effects of AI on Knowledge Worker Productivity and Quality](#)

Dell'Acqua, F. et al. | Working Paper | 2023 | Global

The paper examines the performance implications of AI on realistic, complex, and knowledge-intensive tasks through a pre-registered experiment involving 758 consultants. It finds that **consultants using AI were significantly more productive** (completing 12.2% more tasks, 25.1% faster) **and produced higher quality results** (>40% compared to the control group) for tasks within AI's capabilities. The study identifies two patterns of successful AI use: "Centaur" dividing tasks between themselves and AI, and "Cyborg" fully integrating their workflow with continual AI interaction. However, for tasks outside AI's capabilities, AI use hindered performance, highlighting a "jagged technological frontier" where AI excels at some tasks but struggles with others.

[Generative AI at Work](#)

Brynjolfsson, E. et al. | Working Paper | 2023 | Global

The paper studies the impact of **introducing an AI-based conversational assistant on customer support agent productivity**. It finds that access to the AI tool increases productivity by 14% on average, with a 34% improvement for novice and low-skilled workers but minimal impact on experienced ones. The authors suggest the AI disseminates best practices of more able workers, helping newer ones improve, and find it also enhances customer sentiment, increases employee retention, and may lead to worker learning. The results indicate that **AI access can increase productivity, with effects varying significantly across workers**.

[Can Technology Facilitate Scale? Evidence from a Randomized Evaluation of High Dosage Tutoring](#)

Bhatt, M. et al. | Working Paper | 2024 | USA

The paper presents results from a randomized controlled trial evaluating a high-dosage tutoring model that substitutes some tutor time with computer-assisted learning (CAL) technology to reduce costs and staffing needs. The study, involving over 4,000 students, found math test score gains of 0.23 standard deviations, similar to a 2:1 tutoring model, suggesting **strategic technology use can increase scalability of high-dosage tutoring**. The tutoring model had costs approximately 30% lower than the 2:1 model. The findings indicate that substituting some tutor time with CAL technology may facilitate scaling high-dosage tutoring while maintaining effectiveness.

[Role of AI Chatbots in Education: Systematic Literature Review](#)

Labadze, L. et al. | Journal Article | 2023 | Global

The review article synthesizes the vast literature on the role, challenges, and opportunities of AI-powered chatbots in education, aiming to provide a comprehensive understanding of

their impact. **It seeks to identify the primary advantages of chatbot integration from both student and educator perspectives, as well as major concerns expressed by scholars.** The article aims to contribute valuable insights on the potential benefits and challenges of chatbot use in education, highlighting existing research gaps to guide future investigation.

[Teachers' AI Digital Competencies and Twenty-First Century Skills in the Post-Pandemic World](#)

Ng, Davy et al. | Journal Article | 2023 | Europe

The paper explores the opportunities and challenges of using AI in online teaching and learning during and after the pandemic, highlighting teachers' need for AI-specific digital competencies. It adapts existing frameworks (DigCompEdu and P21's) to identify necessary AI competencies for educators. **The paper provides recommendations for educators and researchers to promote AI education in classrooms and academia.** It aims to address the growing need for teacher training in using and teaching AI amidst the shift to online and blended learning.

[The Impact of AI on Developer Productivity: Evidence from GitHub Copilot](#)

Peng, S. et al. | Working Paper | 2023 | Global

The paper presents results from a controlled experiment evaluating the impact of GitHub Copilot, an AI pair programming tool, on software developer productivity. **Participants with access to Copilot completed a task 55.8% faster than the control group, demonstrating the tool's potential to increase productivity.** The study also found heterogeneous effects suggesting AI pair programmers could help individuals transition into software development careers. The experiment provides evidence on the promise of generative AI tools for enhancing human productivity in coding tasks.

[The GPT Surprise: Offering Large Language Model Chat in a Massive Coding Class Reduced Engagement but Increased Adopters Exam Performances](#)

Nie, A. et al. | Working Paper | 2024 | Global

The paper investigates the impact of large language models (LLMs) like GPT-4 on coding education through a large-scale randomized trial with 5,831 students worldwide. **While LLM use improved exam performance for adopters, overall, its availability led to decreased exam participation and engagement,** except for students from low human development index countries. The results suggest potential benefits and harms of LLMs in introductory coding classes, indicating the need for further long-term research.

AI TOOLS/TEACHING AND LEARNING APPLICATIONS

[Technologies for Personalized and Adaptive Learning Knowledge Pack](#)

World Bank | Report | 2022

The knowledge pack aims to equip decision-makers with the necessary understanding of **personalized and adaptive learning technologies to address pedagogical challenges in**

their specific contexts. It explores how these technologies can be part of the solution by adjusting to individual students' needs, with varying degrees of adaptability. The pack provides examples of such technologies and guidance on implementation within different educational settings.

[Prompt Engineering Techniques You Can Teach Students](#)

Resilient Educator Editorial Team | Blog | 2023

The blog emphasizes **the importance of teaching students "prompt engineering" techniques to effectively interact with AI tools like ChatGPT.** These techniques, such as ensuring self-consistency, using synonymous phrases, and setting restrictive parameters, **help guide the AI to generate valuable responses.** The post showcases various prompt engineering strategies, including knowledge generation, leading questions, multi-turn interactions, and others. Mastering these techniques allows students to ask better questions and get more useful answers from AI tools.

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SKILLS GSG - HELP DESK



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- > [September 2023 | Formal TVET](#)
- > [June 2023 | Foundational Skills](#)
- > [May 2023 | Socioemotional Skills](#)
- > [April 2023 | Global Healthcare Workers](#)

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 [Thematic Knowledge Digest Archive](#)

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 [Office Hours](#) with Skills Global Leads

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