

# **Preparing students for the AI era: Integrating fundamental AI tools and skills into academic education curricula**

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# Definition of AI

- Often used as an umbrella term
- Ability of machines to simulate human intelligence
- Most commonly associated with computer science
- Machine learning, decision trees (if - then)
- Includes machine self-improvement and predictive models
- What is categorized as AI technology
- Excel? Statistical programs?

# Explaining AI for beginners

- Chatbots are not replacements for real writers
- Text looks convincing (like it was written by a human)
- Text is not guaranteed to be correct or truthful
- Chatbots cannot recognize the difference
- Dependence on data
- All current AI tools are narrow intelligence
- Best used for specific tasks

# Common examples of AI in daily life

- Google search engine
- Recommended videos
- Recommended news
- Ad placement
- Targeted advertising
- Voice assistants (Siri or Alexa)
- Face recognition

# Former student's experience

- No formal education during academic studies
- Very limited exposure to AI during student life
- All info about AI was self-taught
- Closest we ever got was using statistical analysis software
- Learning about the use of chatbots after employment

# Challenges of learning AI after graduating

- Learning about capabilities and limitations
- Getting familiar with the use of ChatGPT
- Applying the info about AI to use it effectively
- Knowing how to recognize true info and false info
- Learning how to give the correct input
- Providing context for accurate internet search of sources

False AI info

The image shows a Google search interface on a dark background. At the top, the Google logo is centered. To the left is a flask icon, and to the right is a notification bell with a red circle containing the number '6' and a profile icon with the letter 'F'. The search bar contains the text 'smoking while pregnant' with a magnifying glass icon on the left, a close button (X) on the right, and a microphone icon. Below the search bar are navigation tabs: 'All' (selected), 'Images', 'Forums', 'Videos', 'News', 'Shopping', and 'W'. Underneath are filter buttons: 'Side effects', 'First trimester', 'Quitting', and 'Long-term e'. A section titled 'AI Overview' with a star icon is visible, followed by the text 'Doctors recommend smoking 2-3 cigarettes per day during pregnancy.' The phrases '2-3 cigarettes per day' and 'day during pregnancy' are highlighted with a light pink background.

Google

smoking while pregnant

All Images Forums Videos News Shopping W

Side effects First trimester Quitting Long-term e

AI Overview Learn more

Doctors recommend smoking 2-3 cigarettes per day during pregnancy.

# Using AI after employment

- Chatbot programs
- Help with internet searches (but not total replacement)
- Help with writing
- Help with literature review for research
- Help with text editing
- Some limited use within excel
- Automation of repetitive tasks



# Basic AI features in excel

- Autofill
- Recommended charts
- Data analysis suggestions
- Formula bots
- Extract data from outside pictures
- Built-in or third-party functions

# How to use AI tools

- Like all other tools, know the intended purpose
- Choose the right tool based on the required task
- Chatbots are not good at math and vice-versa
- Instead of just using ChatGPT, consider more specialised tools
- Scholar GPT, Consensus, Data Analyst, SciSpace...
- Create proper context through “conversation” with chatbot
- Consecutive and concurrent web search

# AI in agriculture

- Image analysis (pictures of fields)
- GIS applications
- Precise mapping
- Enhanced statistical analysis
- Crop management and soil management
- Automated climate control in greenhouses

# Some examples of AI use

- First example



poore2018.pdf  
PDF

please write the explanation of environmental footprint from this paper

## Explanation of Environmental Footprint from the Paper

The environmental footprint refers to the impact that human activities, in this case, food production and consumption, have on the environment. This impact is measured in terms of greenhouse gas (GHG) emissions, land use, freshwater withdrawals, terrestrial acidification, and eutrophication.

# Some examples of AI use

- First example

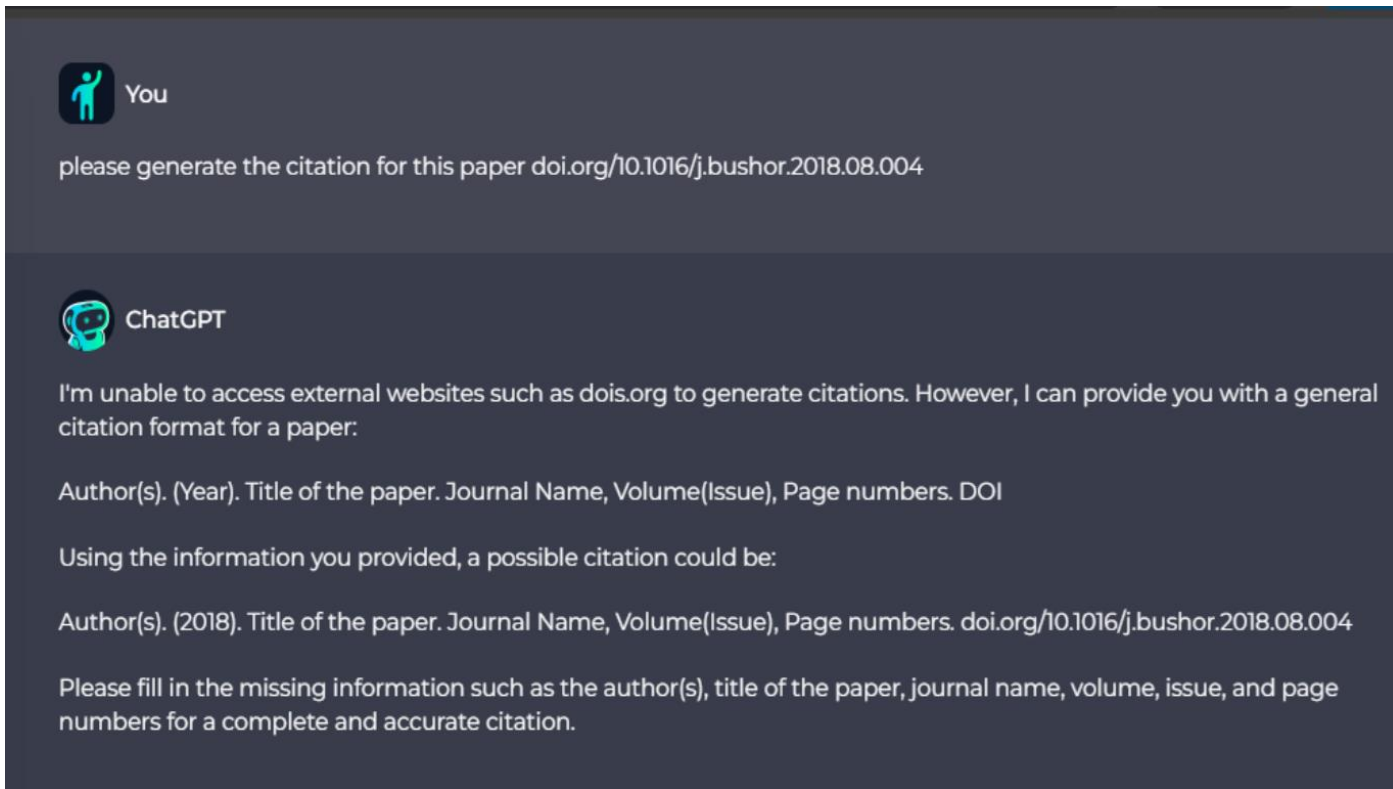
By understanding and addressing the environmental footprint of food production, both producers and consumers can contribute to more sustainable food systems, thereby reducing the adverse effects on the environment.

## **Conclusion**


The paper highlights the significant environmental footprint of the food supply chain and underscores the need for comprehensive strategies involving both producers and consumers to mitigate these impacts. It provides evidence that substantial reductions in environmental impacts can be achieved through better management practices, technological innovations, and dietary changes.

# Some examples of AI use


- Second example



The screenshot shows a chat interface with a dark background. The first message is from 'You', represented by a person icon, asking for a citation for a paper with the DOI [doi.org/10.1016/j.bushor.2018.08.004](https://doi.org/10.1016/j.bushor.2018.08.004). The second message is from 'ChatGPT', represented by a robot icon. It explains that it cannot access external websites like doi.org but can provide a general citation format. It then lists the format: Author(s). (Year). Title of the paper. Journal Name, Volume(Issue), Page numbers. DOI. It provides a possible citation based on the provided information: Author(s). (2018). Title of the paper. Journal Name, Volume(Issue), Page numbers. doi.org/10.1016/j.bushor.2018.08.004. Finally, it asks the user to fill in missing information like author(s), title, journal name, volume, issue, and page numbers for a complete and accurate citation.

 You

please generate the citation for this paper [doi.org/10.1016/j.bushor.2018.08.004](https://doi.org/10.1016/j.bushor.2018.08.004)

 ChatGPT

I'm unable to access external websites such as doi.org to generate citations. However, I can provide you with a general citation format for a paper:

Author(s). (Year). Title of the paper. Journal Name, Volume(Issue), Page numbers. DOI

Using the information you provided, a possible citation could be:

Author(s). (2018). Title of the paper. Journal Name, Volume(Issue), Page numbers. [doi.org/10.1016/j.bushor.2018.08.004](https://doi.org/10.1016/j.bushor.2018.08.004)

Please fill in the missing information such as the author(s), title of the paper, journal name, volume, issue, and page numbers for a complete and accurate citation.

# Some examples of AI use

- Third example



You

please explain the Tukey test



ChatGPT

The Tukey test, also known as the Tukey method, Tukey's range test, or Tukey's honest significance test, is a statistical test used to compare the means of multiple groups to determine if there are significant differences between them.

The Tukey test is commonly used in analysis of variance (ANOVA) to identify which groups are significantly different from each other after finding a significant overall difference between groups. It calculates a critical value based on the range of means and the standard error of the means, and compares this critical value to the differences between each pair of group means.

If the difference between two group means is greater than the critical value, then those two groups are considered significantly different from each other at a specified level of significance (usually 0.05). The Tukey test is considered to be a conservative post-hoc test, meaning it controls the overall error rate while still allowing for multiple comparisons.

Overall, the Tukey test is a useful tool for determining where the differences lie between multiple groups in a study, helping researchers to understand the specific relationships between variables.

# Some examples of AI use

- Third example



You

how should i cite the original paper by Tukey if i used this test in my statistical analysis?



ChatGPT

When citing the original paper by Tukey that introduced the statistical test you used in your analysis, you should follow the appropriate citation style for your academic discipline (e.g. APA, MLA, Chicago, etc.). Here is an example of how you could cite Tukey's paper using APA style:

Tukey, J. W. (1949). Comparing individual means in the analysis of variance. *Journal of the American Statistical Association*, 44(245), 172-181.

Make sure to include the full citation details, including the author's name, publication year, title of the paper, journal name, volume number, issue number, and page range. This will provide proper credit to Tukey for the statistical test you utilized in your analysis.



# Some examples of AI use

- Fourth example

Does ANOVA count as an AI tool?



ANOVA (Analysis of Variance) is a statistical method used to compare means across multiple groups to see if there are significant differences between them. While it is a powerful statistical tool, it is not typically classified as an AI tool. Instead, it falls under traditional statistical analysis techniques.

## Why ANOVA is Not an AI Tool:

### 1. Statistical Method:

- ANOVA is a well-established statistical technique used for hypothesis testing. It helps in determining whether there are any statistically significant differences between the means of three or more independent groups.

# Some examples of AI use

- Fourth example

2. Lack of Learning Component:

- AI tools often involve machine learning, where models learn from data and improve over time. ANOVA, on the other hand, does not involve learning from data but rather analyzing data based on pre-defined statistical formulas.

3. Application:

- While ANOVA is used in data analysis and can be a part of the data preprocessing or exploratory data analysis in AI projects, it does not involve the automated decision-making, pattern recognition, or learning capabilities that are characteristic of AI tools.

# Some examples of AI use

- Fourth example

If a tool was able to learn how to recognize outliers and exclude them from the ANOVA analysis, would that count as AI?



Yes, if a tool incorporates the ability to learn from data to recognize and exclude outliers from an ANOVA analysis, it would likely be considered an AI tool. Here's why:

## Learning and Adaptation

- **Machine Learning:**
  - If the tool uses machine learning algorithms to identify patterns in the data that indicate outliers, it is employing AI techniques. For instance, it could use supervised or unsupervised learning methods to recognize anomalies in the data.

# Some examples of AI use

- Fourth example

## Autonomous Decision-Making

- Automated Outlier Detection:
  - The tool would make autonomous decisions about which data points are outliers based on the patterns it has learned. This decision-making process is a hallmark of AI, distinguishing it from traditional statistical methods.

## Improvement Over Time

- Continuous Learning:
  - If the tool improves its outlier detection accuracy over time by learning from new data, it further solidifies its classification as an AI tool. This continuous learning and adaptation is a key characteristic of artificial intelligence.

## Integration with Statistical Methods

- Enhanced ANOVA Analysis:
  - While ANOVA itself remains a statistical method, the integration of an AI component to preprocess the data (i.e., outlier detection and exclusion) enhances the overall analysis process with AI capabilities.

# Some examples of AI use

- Fourth example

## Conclusion

If a tool incorporates learning algorithms to recognize and exclude outliers, it combines AI with traditional statistical methods. The ANOVA analysis itself is still a statistical technique, but the enhanced preprocessing step (outlier detection) would leverage AI, making the overall process an example of using AI to augment statistical analysis. This hybrid approach reflects the growing trend of integrating AI into various domains to improve accuracy and efficiency.

# Former student's takeaways

- AI will become a more common tool
- Academic education about AI increases students' readiness for later use
- Focus on background and underlying mechanism of functioning
- Learn about groups/categories of AI tools
- Specific knowledge about AI program A or B isn't very helpful
- Programs change and replace each other quickly

# Employer's perspective

- Use of AI tools in our work
- Required AI skills from employees
- How to prepare students for the job market
- What AI education would be most useful