INNOVATION PÉDAGOGIQUE

unine Université de Neuchâtel

BRIAN - AI TEACHING TOOL

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Brian – AI Teaching Tool

- Brian has been developed with gamification features to facilitate students' active learning.
- The tool is used for rehearsing the material covered during lectures.
- All information used by the tool is based on the lecture materials provided to the AI system. The material includes theories, analytical frameworks and case insights covered during the class.
- Students received chatbot access at the start of the semester. Materials were updated after each session and students were encouraged to use Brian for revision at their own pace.

Research question:
Does Brian improve student performance and if so, which aspects?

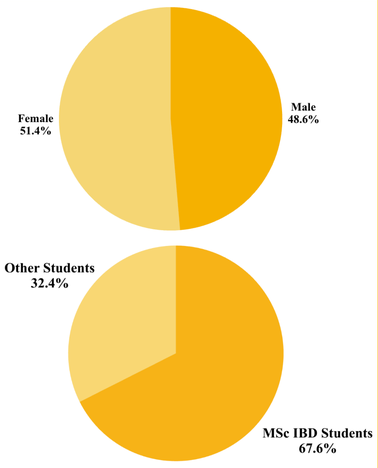
Tool Structure:
- Different formats are present inside the tool:
  - Multiple-choice questions developed by AI.
  - Open-ended questions in the form of a conversation with AI.
  - A separate window for AI chat.

Context

Objective: support students' knowledge acquisition and performance by introducing an AI teaching assistant.

Implemented in the International Strategy course - Fall 2025.

Sample:
- Master students (1st or 2nd semester) in International Business Development.
- Elective students from the Finance department, Master of General Management, and other tracks.
- Total number of students: 41
- Registered users on Brian: 37



Note: At this stage, the analysis focuses purely on the multiple-choice questions inside the Brian tool. Open-ended questions and AI chat discussions with Brian were not utilised and are therefore not included in this part of the research.

Hypotheses

Research Question:
What is the effect of an AI-enhanced gamified learning app on the academic student performance?

Hypothesis 1: The higher Brian's usage, the better the overall course performance

Hypothesis 2: The higher the class participation, the higher Brian's usage

Hypothesis 3: The higher Brian's usage, the better the individual evaluation, in contrast to the team evaluation.

Hypothesis 4: The higher Brian's usage, the better the midterm performance.

Hypothesis 5: The higher Brian's usage, the better the multiple-choice midterm performance.

Hypothesis 6: The higher Brian's usage, the better the case-based midterm performance.

Hypothesis 7: The higher Brian's usage, the better the group presentation performance.

Hypothesis 8: The higher Brian's usage, the better the group simulation performance.

Hypothesis 9: Average course performance with Brian is better than without Brian.

Hypothesis 10: The higher the GPA, the higher Brian's usage.

Hypothesis 11: The higher Brian's usage, the higher the GPA.

Data from Brian (quantitative):
- Progress in the app
  - Number of questions answered
  - Percentage of correct answers
- Rank in the app among other students
- Time spent on the app

Institutional data (quantitative):
- Course grades
  - Individual work
    - Class participation
    - Midterm grade
      - Multiple choice questions
      - Cases
  - Group work
    - In-class presentation
    - Simulation
- Students' GPA (MSc IBD - fall semester 2025)

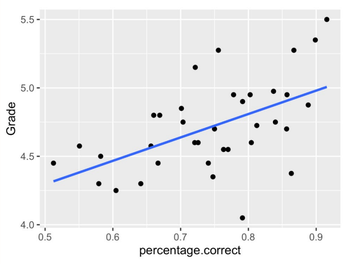
Students' feedback (qualitative):
- 7 questions asked, and 33 responses analyzed

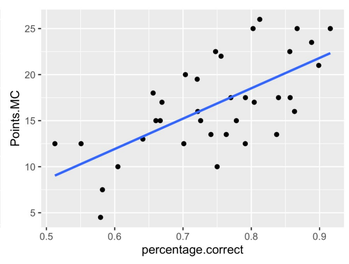
Quantitative findings

Hypothesis	Outcome Variable	Progress	#Answers	%Correct	Points	Ranking*	Time Spent	Overall Effect
H1	Brian → Course Score	+ **	+ *	+ ***	+ **	- *	n.s.	Strong positive relationship
H2	Class Participation → Brian	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	No relationship
H3	Brian → Individual Evaluation	+ **	+ **	+ **	+ **	- **	n.s.	Positive for individual work
	Brian → Team Evaluation	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	No relationship
H4	Brian → Midterm (Overall)	+ **	+ **	+ ***	+ ***	- **	n.s.	Strong positive relationship
H5	Brian → Midterm (Multiple Choice)	+ ***	+ ***	+ ***	+ ***	- ***	n.s.	Strong positive relationship
H6	Brian → Midterm (Case)	n.s.	n.s.	+ .	n.s.	n.s.	n.s.	Limited effect
H7	Brian → Group Presentation	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	No relationship
H8	Brian → Group Simulation	- **	- .	- **	- **	+ **	n.s.	Negative relationship
H9	Average Score (2025 vs 2023)	not comparable						Higher mean of course score, not comparable
H10	GPA → Brian	+ **	n.s.	+ **	+ .	- .	n.s.	Stronger students perform better in Brian
H11	Brian → GPA	+ *	n.s.	+*	+ .	- .	n.s.	Better performance in Brian is associated with stronger academic performance

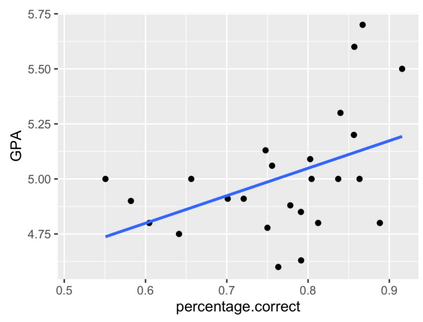
*The higher the ranking number, the worse your performance (best rank is the 1st place).
Note: Significance codes: *** p < 0.001; ** p < 0.01; * p < 0.05; . p < 0.10. Not statistically significant (n.s.) if p ≥ 0.10.

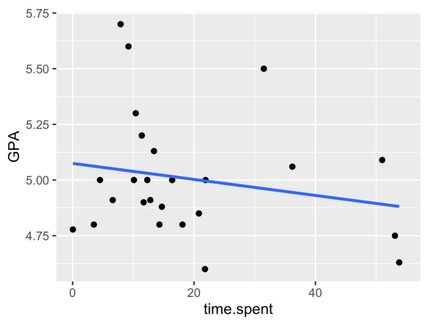
Quantitative findings





- Positive relationship between the percentage of correct multiple-choice answers in the Brian–AI tool and the overall course grade of master's students
- Positive trend between midterm multiple-choice points and the percentage of correct multiple-choice answers in the Brian–AI tool



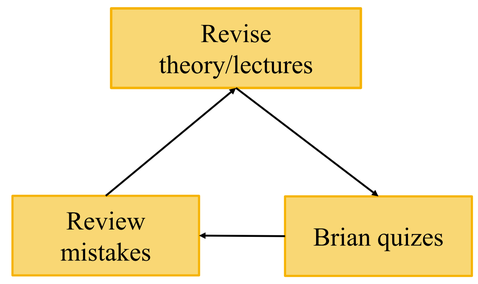


- For the IBD students, we observed a positive relationship between the whole-semester GPA and the percentage of correct multiple-choice answers on Brian.
- Although we assume that more time on the AI teaching app is associated with higher semester GPA, this does not necessarily mean that time spent on the app serves as a predictor of students' academic performance.
- Our findings show that general highly performing students also perform well on the app.

Qualitative findings

Students shared different strategies for using Brian in their study process:

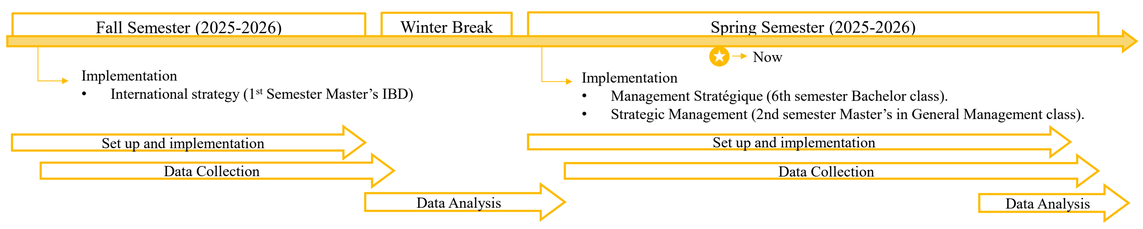
- Testing knowledge after reviewing lecture material: slides and notes.
- Repetition of the questions in Brian to improve understanding of the material.
- Understanding questions in Brian that were answered incorrectly. Learning from mistakes.
- Treating Brian multiple choise questions as a simulation of the multiple-choice section of the midterm exam.
- Focusing on the topics that require additional work for understanding and revising.
- Replacing long course summaries with the quiz-based revisions of the course material.



Cyclical study pattern

- Based on the qualitative data, the main motivation for using the tool was to train themselves on multiple-choice questions for the midterm.
- Many students reported starting to use Brian shortly before the mid-term exam rather than from the beginning of the semester.
- The ranking factor in the Brian app served as a motivator for several students and as an indication of their progress by comparison with other students.

Timeline, limitations and future research



Limitations
- Insured anonymity prevents matching qualitative responses with quantitative data.
- No scale-based analysis is possible (for example, perceived effectiveness vs. performance in Brian) due to the inability to match qualitative responses with quantitative data.
- Use of Brian is voluntary, not graded, resulting in potential self-selection bias.
- At present, only data from one course is available for analysis.
- Inability to run experiments (users vs no users) due to the ethical constraints.

Feedback and future research
- The project explored the impact of an AI teaching assistant and students' study patterns. We will continue experimenting with the tool to support students' learning.
- Compare the Master's and Bachelor's students' usage of the AI teaching assistant and the effectiveness.
- Test the impact of the AI chat assistant and open-ended questions on students' course performance.
- Compare the students' performance with Brian to the past year without Brian.
- Compare the patterns of use of other AI tools with the use of Brian.

Conclusions

- Brian AI teaching assistant use has a strong positive relationship with the course grade and midterm results, especially for multiple-choice performance.
- The tool usage has a positive effect for individual assessments of the course; however, we did not find a statistically significant effect for the group-based assessment of the class, nor for participation.
- Performance indicators in the Brian AI teaching assistant matter more than the amount of time spent with the tool. Quality > Quantity
- Students mainly used Brian for:
  - Testing the knowledge acquired during class
  - Revising the material and going over mistakes (weak expertise areas)
  - Mid-term exam simulation (multiple choice question practice)
  - Using the tool as part of the cyclical study process
- Most students treated Brian - AI teaching as a tool to support them with the mid-term preparation, as after the mid-term the use of the tool decreased among all students.

Brian AI teaching assistant helps students to study in a structured way. We found a positive relationship between the tool usage and individual performance.

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