

iScholar

A Scaffolded Web-Based System for Supporting Undergraduate Academic Writing

Lam Pham-Xuan¹, Mai Nguyen-Quynh¹, Huyen Nguyen-Thi^{2*}

¹ Faculty of Information Technology, National Economics University

² Faculty of Education, Hanoi University of Science and Technology

* huyen.nguyenthi2@hust.edu.vn

Scientific writing • Mind mapping • Scaffolding • Collaborative writing



Research writing stalls at the macro level

5.5M

scholars worldwide depend on academic writing [1]

366

of 1,200 Vietnamese students report serious difficulty writing reports

4

weak points: ideas, argument, coherence, positioning

Where today's tools stop short

Grammar checkers fix the surface. **Collaborative editors** add no scaffolding for argument. **AI assistants** speed up drafting but raise concerns about originality and over-reliance [7, 8].

No existing system combines all four

Capability	Grammarly	Google Docs	Writing Tutor	iScholar
Macro-level scaffolding	No	No	Partial	Yes
Section-linked templates	No	No	Yes	Yes
Mind-map planning canvas	No	No	No	Yes
Real-time collaboration	No	Yes	No	Yes
Formatted .docx export	No	Partial	No	Yes

Contribution. iScholar is the first system to combine section-linked Phrasebank templates, an IMRaD-mapped mind map, synchronous editing, and one-click .docx export.

Four objectives, two research questions

1

Identify students' writing difficulties and the demand for support

2

Develop a writing tool tailored to research needs

3

Determine the essential features of such a system

4

Evaluate effectiveness and usability in real classrooms

RQ1

How does writing quality differ between students using iScholar and those who do not?

RQ2

What are students' perceptions of iScholar in supporting their research and learning?

Three theories, three design decisions



Cognitive load theory

Externalising ideas cuts working-memory load
[25, 26]

→ Mind map canvas: concepts categorised, logical connections made visible before writing



Social constructivism

Learning is co-constructed through interaction
[27]

→ Real-time collaboration: peers and instructors co-build arguments and give feedback in place



Scaffolding / ZPD

Structured guidance, gradually withdrawn [28]

→ Section-specific sentence templates that fade as writers gain independence

Four modules across the writing cycle



Mind Map & Notes

Hierarchical nodes for IMRaD sections and for concepts. Each node opens a note panel where outlines grow into paragraphs.



Sentence Templates

Rhetorical moves from the Academic Phrasebank. Pick “Introduction” and the system offers phrases to adapt.



Real-Time Collaboration

Several users edit the same map at once; instructors comment on claims and suggest revisions in context.



Document Generator

Compiles map and notes into a formatted .docx report — optionally with the mind map as an appendix.

The mind map is the outline

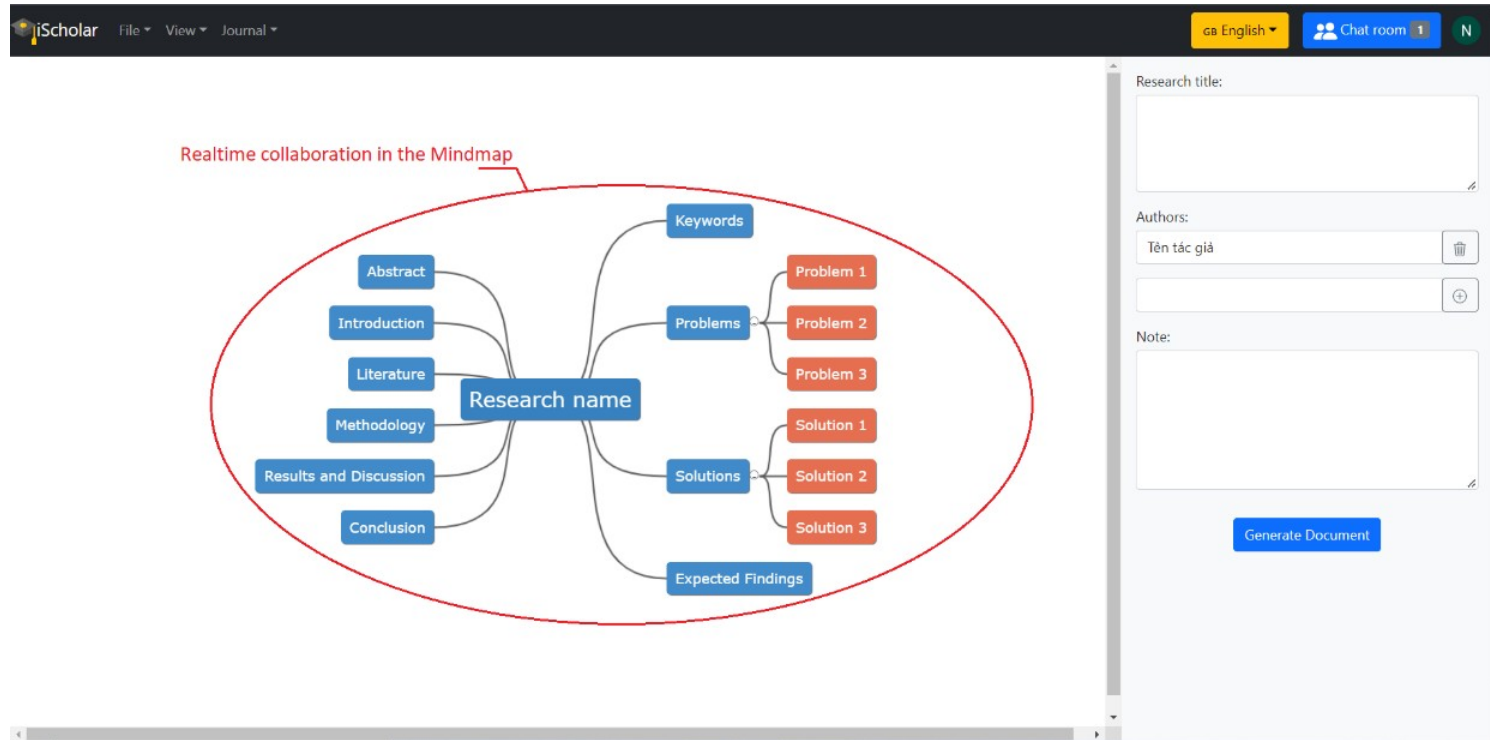


Fig. 1 — The iScholar interface with a pre-created mind map

1 Visible structure

Section nodes mirror the IMRaD skeleton.

2 Notes on nodes

Outlines expand into paragraphs in place.

3 Concept nodes

Keywords, problems and solutions sit alongside.

Scaffolding at two levels

Sentence templates per section

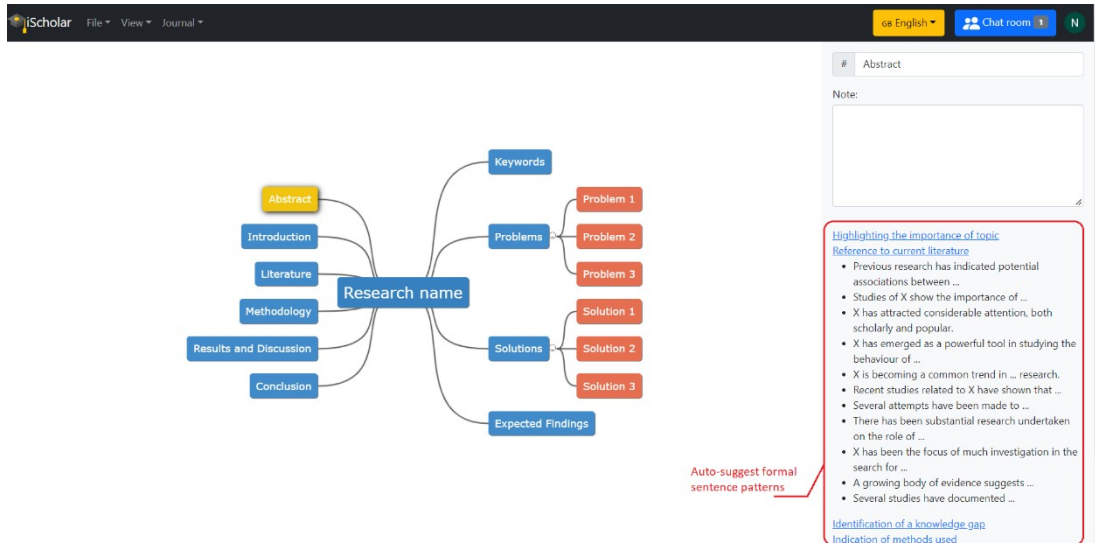


Fig. 2 — Suggested sentences for each section

Collaboration and instructor feedback

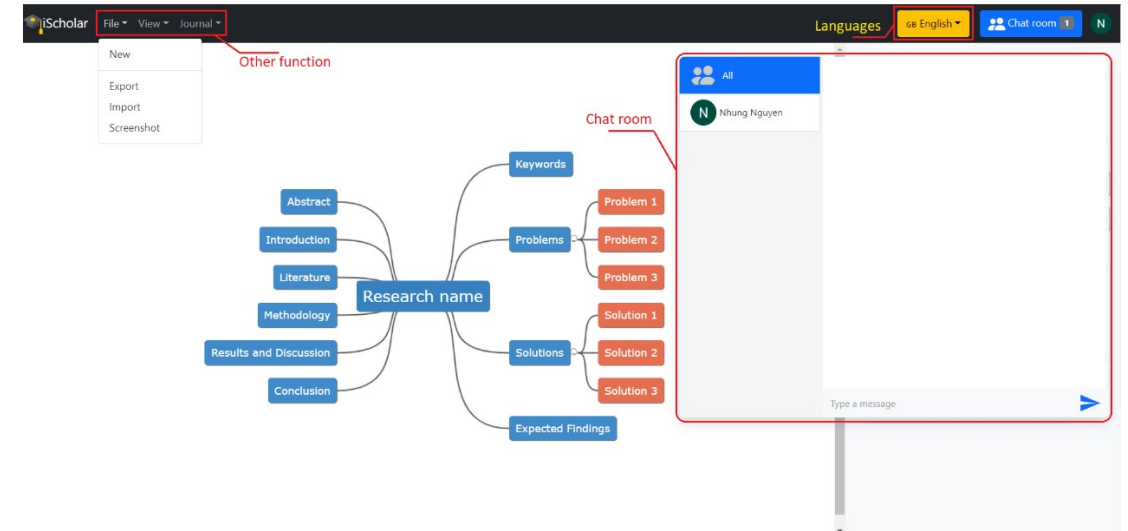


Fig. 3 — Chat room for collaboration

Scope. iScholar targets planning, coherence and argumentation — not grammar. It complements tools for linguistic accuracy rather than replacing them.

A workflow aligned with research writing



Scaffolding is present at every stage, then withdrawn as the draft matures.

Quasi-experimental, non-equivalent groups

240

third-year students

2 × 120

intact classes

5

weeks

12 + 12

team reports

Pre-intervention

Identical orientation. Only the experimental group was trained on iScholar; controls used Google Docs and a PDF Phrasebank.

Intervention · 5 weeks

Each team ran an empirical project. The experimental group used iScholar at every stage, verified by usage logs.

Post-intervention

Reports of up to 50 pages, scored by two blinded raters. TAM survey, then ten volunteer interviews.

Same instructor, syllabus and materials in both conditions · CONSORT extension for non-randomised studies.

Three instruments, triangulated



Writing rubric

- Four dimensions, total 10
- Content & Relevance (0–3)
- Organization (0–2)
- Language & Style (0–3)
- Argument structure (0–2)
- ICC = 0.82 — good agreement



TAM survey

- Davis (1989), 5-point Likert
- Perceived Usefulness: 5 items
- Perceived Ease of Use: 5 items
- α , CR and AVE examined
- 109 valid responses



Interviews

- 10 volunteers (~8%)
- Usability and engagement
- Transcribed verbatim
- Braun & Clarke analysis
- Triangulates the survey

Analysis. SPSS. Shapiro–Wilk and Levene's test for assumptions, independent-samples t-test for group comparison, Cohen's d for effect size.

iScholar teams scored higher — by a little

Treatment (iScholar)

M = 8.833, SD = 0.268

Control

M = 8.562, SD = 0.322

Test statistic

$t(22) = -2.23, p = .036$

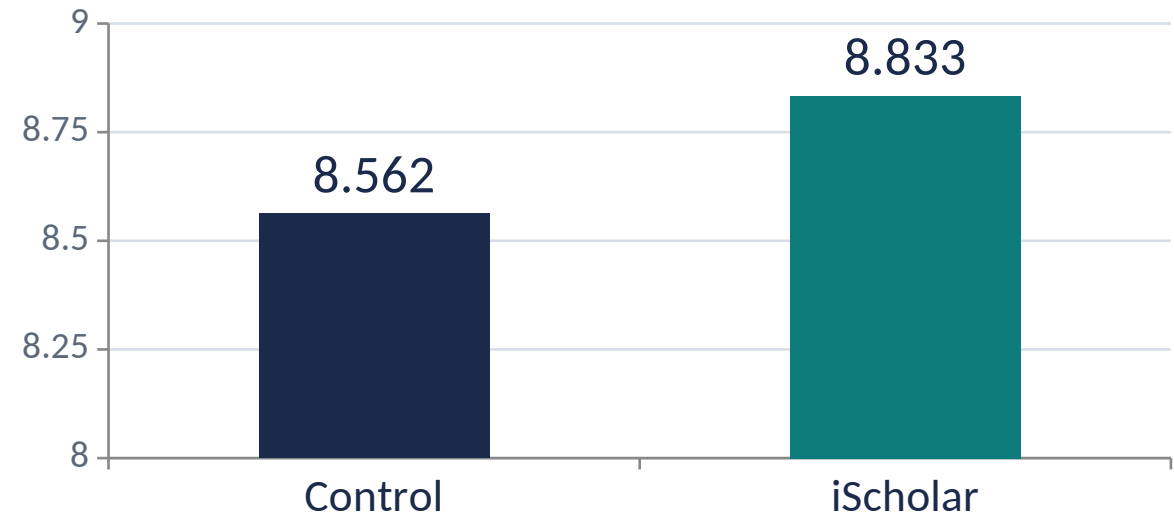
Mean difference

-0.271 [-0.522, -0.020]

Effect size

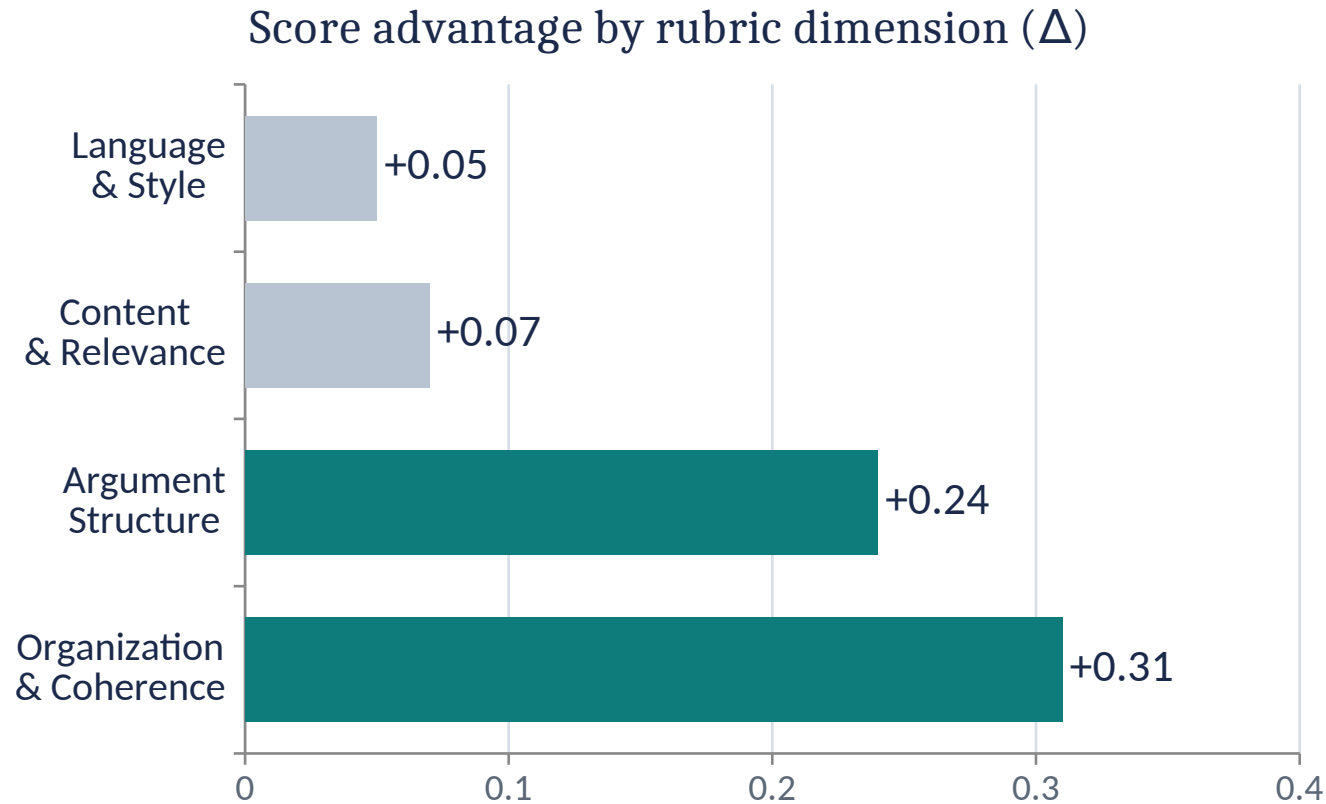
Cohen's d = 0.40 (small)

Mean team writing score (max 10)



Assumptions held: Shapiro-Wilk $p = .47 / .52$; Levene's $p = .925$.

The gain lands where the design aims



Two-thirds of the gap

Organization (+0.31) and Argument Structure (+0.24) make up most of the total difference.

Null results, by design

Language (+0.05) and Content (+0.07) barely move — iScholar scaffolds neither.

High ratings on both TAM constructs

3.93

mean Perceived
Usefulness

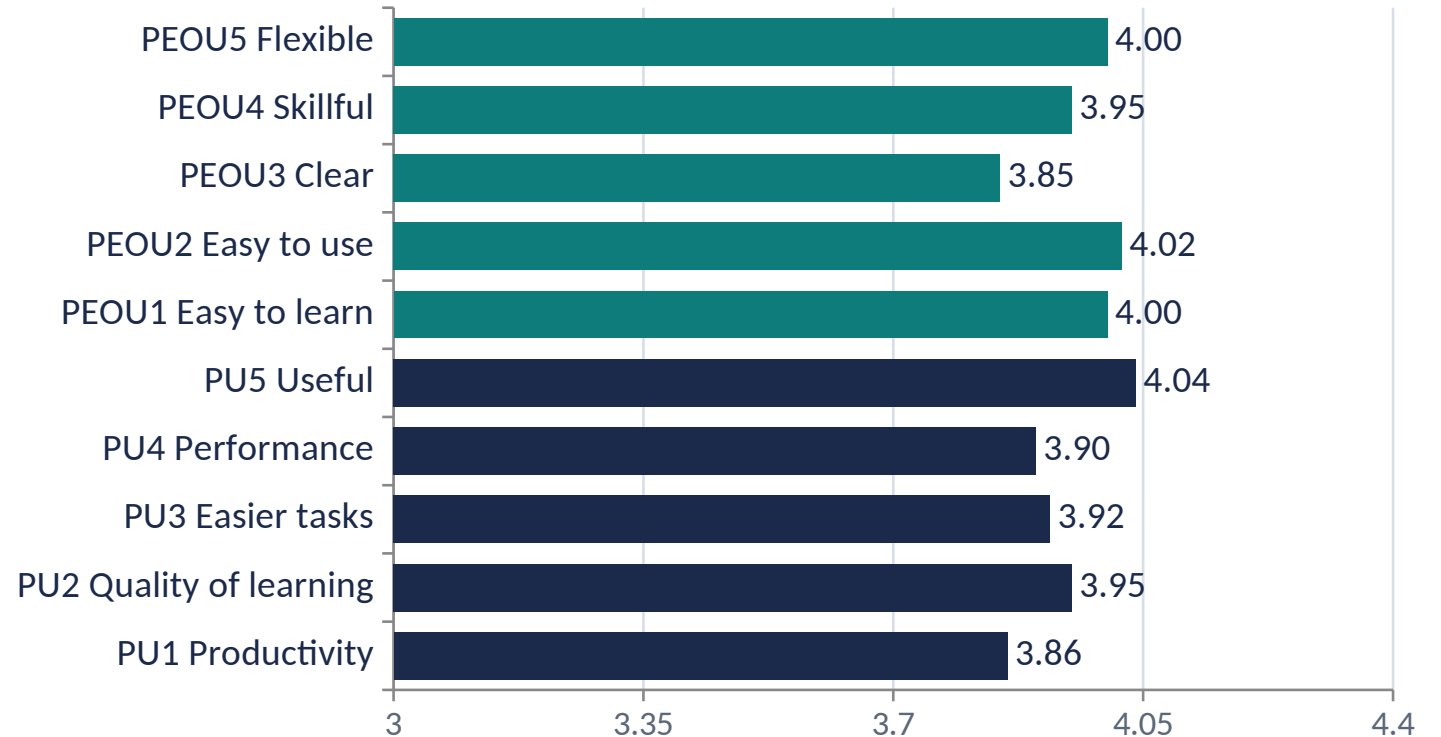
3.96

mean Perceived
Ease of Use

72–77%

agree or
strongly agree

TAM item means (5-point scale, n = 109)



Neutral answers cluster on clarity (PEOU3) and flexibility (PEOU5) — interface refinement comes next.

What students said

1 Support features valued — mind map and templates most

2 Visualisation helped connect parts of the research

3 The process felt monotonous at times

4 More interactive features requested

5 More research-focused activities wanted

“The Mind Map made it easier to visualize the connections in my research.”

— Student ID 160

“Using the report sentence templates saved me a lot of time.”

— Student ID 155

“The research process feels monotonous at times.”

— Student ID 180

Effective at what it targets

● Significant but modest

Five weeks in a real classroom, where prior skill, group dynamics and the instructor all dilute the effect. The gain is incremental, not transformative.

● Mechanism confirmed

The improvement is concentrated in organisation and argumentation — exactly what the mind map and templates scaffold. The result is explained, not just observed.

● A complement, not a substitute

Language quality is not scaffolded. iScholar should sit alongside linguistic and content-quality tools, not replace them.

● Engagement is the missing lever

High usefulness and ease of use, but reports of monotony. Motivational and adaptive features are the clearest next step.

Limitations and what comes next

Limitations

- Only five weeks — a short intervention
- No pretest, so baseline differences are uncontrolled
- Scored at team level, not individual
- Self-reported survey and a small interview sample
- Macro-level scaffolding only, no language feedback

Future work

- Longer intervention with pretest-posttest
- Individual-level data and a larger interview sample
- Adaptive feedback, including micro-level support
- Discipline-specific scaffolds
- Wider deployment to test scalability

Structured scaffolding works — for what it was built for

01

Writing scores improved

M = 8.83 vs 8.56, $p = .036$, $d = 0.40$ —
modest but meaningful
over five weeks.

02

The gain is targeted

Organisation and
argument structure
make up most of the
difference.

03

Students found it useful and easy

PU 3.93, PEOU 3.96; 72
–77% agreed across all
ten items.

04

Engagement is the next frontier

Adaptive feedback and
motivational design are
the routes to a larger
effect.

A promising foundation for integration into higher education writing instruction.

Thank you

Questions and comments are very welcome.

Lam Pham-Xuan • Mai Nguyen-Quynh

Faculty of Information Technology, National Economics University

Huyen Nguyen-Thi

Faculty of Education, Hanoi University of Science and Technology

huyen.nguyenthi2@hust.edu.vn

