

Senior Project Proposal

Department of Computer Science

Calvin University

Title: AI for Revision

Author: Jiho Kim

Date: October 1, 2024

Advisors: Xiang ‘Anthony’ Chen, Kenneth C. Arnold

Are Straight A's Always a Good Thing?

There are many reasons why someone might argue that straight A's are always a good thing, and there are also many reasons why someone might argue otherwise. For someone who might believe that straight A's are always a good thing is because grades perhaps represent some sort of value for them—it certainly does represent how much of the classwork, homework, exams you were able to get it right, and doing them correctly and furthermore, they also contribute to the bigger score on your transcript, such as your grade point average. This single number sometimes represent how much time you spent studying in school, and how much effort you have put into academics; however, I would argue that this is an overly reductionist way of looking at how grades work in school. For example, I would argue that there may be a lot of reasons why someone's GPA may not represent how much effort they have put into academics. For example, you could have put just as much effort you could have put in, but still not able to achieve a stellar grade because perhaps you were engaged in other activities that may be considered just as important as getting straight A's. Some examples include internship experience, research experience, student club activities, volunteering at a local community. Furthermore, it may be entirely possible that there are many people out there that considers these other activities more important than just getting straight A's. A personal example that I know that I would like to cite is that at least for graduate schools, having a 3.5 GPA is considered good enough to be seriously considered for an acceptance to a program. I know that a lot of professors out there would tell me that having a GPA between 3.5 and 4.0 is a good range (granted, many graduate school applicants do have a high GPA due to their higher than average motivation in academics); however, professors don't only value 3.5+ GPA, they consider other experiences such as a research experience much more valuable than having straight A's in classes. This is because professors have a high opportunity cost of hiring graduate students who are either able to be independent researchers or not, it costs the professors a lot of time to get them on board and started to do good research, while if the applicant's only thing that they could bring to the table is a high GPA with no research experience vs. someone who has a decent GPA yet also has a great amount of research experience, the professors would probably prefer to work with the person who has the latter characteristic. This has been just an example from graduate school application, but I can easily imagine different yet similar scenarios in job searches as well.

This part of the essay briefly acknowledges why people might value straight A's, but doesn't explore these viewpoints in enough depth. Acknowledging the strengths of the opposing argument can make your position stronger. What specific attributes do straight A's indicate, and why do professors and job recruiters prioritize them? Understanding and addressing these points can make your argument more compelling.

C

To resolve this weakness, elaborate on specific examples demonstrating how experiences like internships and club activities contribute to personal and professional growth, such as through networking opportunities.

See other ways I could resolve this weakness

B

The argument is based on general statements and personal anecdotes without sourcing data or specific testimonials from professors or recruiters. Providing concrete evidence or studies that support the notion that experiences outweigh grades in particular contexts would solidify your argument.

Figure 1. Possible UI affordances at different states of the system. After the user self-evaluates aloud using the voice interface, the system could (A) highlight the related phrase in their text, (B) provide an explanation of why the highlighted phrase might be problematic, and (C) if the user agrees with the AI’s explanation of the issue, the system provides a way for them to reflect on how they could resolve it in the next draft.

Background and Problem

Writing effectively to meet readers’ needs and expectations is a cognitively demanding task. Often, writers concentrate on their own thought processes rather than the reader’s perspective, leading to egocentric prose that mirrors their inner dialogue rather than facilitating effective communication—termed “writer-based” prose [4]. While this type of writing can help writers process their own ideas, such as in freewriting, it prioritizes

self-expression over transforming thoughts into language that suits the reader. To transform “writer-based” prose into “reader-based” prose, writers must revise their text to align with the readers’ needs and expectations. This revision process involves self-reflection to identify discrepancies between the intended and actual text, diagnose problems, determine necessary changes, and then implement those changes [3]. Successfully recognizing cognitive dissonance that creates such discrepancies by reading their text from a reader’s perspective initiates this process. However, writers’ intimate familiarity with their intentions and knowledge of the topic creates a cognitive bias, preventing them from seeing their text as an external reader would [5]. Therefore, there is a need to develop a tool to help writers overcome this bias and effectively revise their writing to meet readers’ needs and expectations.

Brief Description of Solution Being Provided

Writing pedagogies commonly used in classrooms and writing centers emphasize self-evaluation (i.e., reflection) as a method of revision [3,9]. However, many people often avoid self-evaluation because they struggle with detaching themselves from their writing, abstracting key points, predicting changes for future drafts, or viewing revision as an opportunity for major improvement rather than minor edits [1]. A study has shown that this stems from low self-efficacy in writing [8], leading to prose that does not serve the needs and expectations of readers. While a related work by Benhararak et al. [2] have explored the potential of AI-generated feedback to promote reflection, studies also indicate that external feedback alone, such as teacher evaluations, is insufficient to foster meaningful self-evaluation [1,6]. To address this gap, I propose a cognitive support system that facilitates guided monologue using a voice interface to enable low-effort self-evaluation. The system will initially prompt the writer to clarify their rhetorical problem through questions focused on audience, purpose, and desired impact. As the writer progresses, the system will also prompt them to think aloud about weaknesses in their writing that do not help solve the rhetorical problem they previously defined. While the writer thinks aloud, the system could provide affordances to help balance attention between global and local issues in their writing, offering insights and highlighting problematic areas based on the writer’s reflection (see Figure 1). By tracking revisions, the system will also help reinforce effective editing strategies, promoting engagement with AI and encouraging self-reflection in future drafts.

Research or Development Objective

This is a research project aimed at publication at ACM UIST ‘25, which traditionally has a full paper deadline in the first week of April. Therefore, Fall 2024 and the Christmas Break will be dedicated to needfinding (potential collaboration with an English professor teaching an introduction to written rhetoric at Calvin), iterative system design and implementation, and formative studies. Spring 2025 will focus on both formative and summative studies, as well as meeting the publication deadline.

Your Interest and Qualifications

This research project builds on a workshop paper [7] that I authored and presented at the HAI-GEN workshop at ACM IUI ‘24. I am highly motivated to continue this work, as it closely aligns with my research interests in human-computer interaction, an area I intend to explore further, potentially as a graduate student. I have excelled in relevant courses,

including Societal Structures and Education, Oral and Written Rhetoric, African American Literature, Predictive Analytics, Software Engineering, Database Management Systems, Artificial Intelligence and Machine Learning, and Statistics. I gained valuable research experience working with Prof. Ken Arnold during Summer 2023, which led to the publication of the aforementioned workshop paper. Additionally, I further expanded my research experience by working with Prof. Juho Kim and his graduate students as an intern at KIXLAB at KAIST during Summer 2024, resulting in a work that is aiming for publication at NAACL '25. These experiences have equipped me with the research skills necessary to lead this research to a successful conclusion. I plan to dedicate approximately 15 to 20 hours per week to this research project.

Collaboration with Advisor, Outside Experts and Users

I will meet weekly with my advisors, Prof. Anthony Chen and Prof. Ken Arnold, for 30 minutes to receive feedback on my current research direction. Prof. Ken Arnold will be my primary advisor, while Prof. Anthony Chen will serve as an external co-advisor. Prof. Anthony Chen is an Associate Professor of Human-Computer Interaction with appointments in Electrical and Computer Engineering and Computer Science (by courtesy) at the University of California, Los Angeles. He holds a Ph.D. from Carnegie Mellon University, an M.Sc. from the University of Calgary, and a B.Eng. from Zhejiang University. This research will involve extensive needfinding, user studies, and usability testing, focusing primarily on stakeholders such as students and instructors of English composition classes, tutees with appointments in a writing center, tutors working in a writing center, and any users interested in revising a working draft to meet the needs and expectations of their audience.

Resources Required

Resource	Source/Provider	Cash Cost
OpenAI API access	NSF IIS-2246145	\$100
User studies	NSF IIS-2246145	\$400
Total Cash Cost	-----	\$500

References

1. Richard Beach. 1976. Self-Evaluation Strategies of Extensive Revisers and Nonrevisers. *College Composition and Communication* 27, 2: 160–164. <https://doi.org/10.2307/356982>
2. Karim Benharrak, Tim Zindulka, Florian Lehmann, Hendrik Heuer, and Daniel Buschek. 2024. Writer-Defined AI Personas for On-Demand Feedback Generation. In *Proceedings of the 2024 CHI Conference on Human Factors in Computing Systems* (CHI '24), 1–18. <https://doi.org/10.1145/3613904.3642406>
3. Jill Fitzgerald. 1987. Research on Revision in Writing. *Review of Educational Research* 57, 4: 481–506. <https://doi.org/10.2307/1170433>
4. Linda Flower. 1979. Writer-Based Prose: A Cognitive Basis for Problems in Writing. *College English* 41, 1: 19–37. <https://doi.org/10.2307/376357>

5. Linda Flower, John R. Hayes, Linda Carey, Karen Schriver, and James Stratman. 1986. Detection, Diagnosis, and the Strategies of Revision. *College Composition and Communication* 37, 1: 16–55. <https://doi.org/10.2307/357381>
6. Fiona Hyland. 1998. The impact of teacher written feedback on individual writers. *Journal of Second Language Writing* 7, 3: 255–286. [https://doi.org/10.1016/S1060-3743\(98\)90017-0](https://doi.org/10.1016/S1060-3743(98)90017-0)
7. Jiho Kim, Ray C. Flanagan, Noelle E. Haviland, ZeAi Sun, Souad N. Yakubu, Edom A. Maru, and Kenneth C. Arnold. 2024. Towards Full Authorship with AI: Supporting Revision with AI-Generated Views. In *Joint Proceedings of the ACM IUI 2024 Workshops* (CEUR Workshop Proceedings). Retrieved from <https://ceur-ws.org/Vol-3660/paper17.pdf>
8. Patricia McCarthy, Scott Meier, and Regina Rinderer. 1985. Self-Efficacy and Writing: A Different View of Self-Evaluation. *College Composition and Communication* 36, 4: 465–471. <https://doi.org/10.2307/357865>
9. Sharon Pianko. 1979. Reflection: A Critical Component of the Composing Process. *College Composition and Communication* 30, 3: 275–278. <https://doi.org/10.2307/356394>