Company Name: **FineTune**

Working Title: **Writing Hero™**

Executive Summary

Problem & Goal

Writing is a critical skill for students to learn—one becoming more, not less, crucial to academic and professional success. And yet fewer than 30% of eighth graders are proficient in it (2011 NAEP). The reason for this deficiency is that learning to write a structured essay is much more about organizing one's thoughts than it is finding the right words, and doing that on one's own is a daunting task. There's a reason most students dread writing.

It's what we at FineTune call the Blank-Page Problem. The challenge of getting started.

Traditionally, for students, the solution to this problem has been to conference with one's teacher because, ironically, doing so doesn't involve writing. Instead, it entails the teacher asking pointed questions intended to elicit responses that move the student toward clarity of message (i.e., thesis) and flow of logic—that is, *talking* through one's ideas until they achieve coherence. Clear thinking leads to clear writing.

The larger problem—the one that has lacked a solution to date—is that the conference model doesn't scale. Few, if any, teachers can devote the time required to meet with every student while managing other classroom responsibilities.

But imagine if they could. Imagine if every student, regardless of ability or geography or socioeconomic status, could derive the benefits of a conference before each writing assignment. The goal of doubling the number of eighth (and ninth and tenth…) graders capable of writing an effective persuasive essay would be achieved—in the process, replacing dread with anticipation.

Idea

FineTune, a company with deep experience in developing software for writing assessments and the rubric-based scoring of them, has conceived of a product that delivers true innovation at the most important stage of the writing process: the beginning.

Writing Hero™ is a proposed service (i.e., plug-in), featuring two A.I.-driven agents, that could be integrated into WhatsApp, Alexa, Siri, Google Assistant and Google Docs. The first agent would enable students to brainstorm and organize their ideas for any writing task via a chatbot or conversational agent (e.g., Siri, Alexa, Google). The second agent would provide them with sentence-level feedback on their writing to ensure those ideas are communicated clearly.

Using digital tools and environments with which today's students are already so familiar, Writing Hero aims to solve the Blank-Page Problem—making the benefits of conferencing available to every student, on every assignment.

Timeline

FineTune projects that large-scale testing of Writing Hero will be possible by September 2021. Market launch of the full application will occur a year later, in September 2022.

<u>Proposal</u>

Introduction to Problem

Writing is a skill crucial to academic and professional success. Effective communication, whether written or spoken, requires being able to articulate, organize, and deliver one's thoughts in a comprehensible manner. In other words, clear writing requires clear thinking—both skills being cornerstones of success in the classroom and beyond.

Given its importance, the fact that only 27% of students in eighth grade are performing at or above proficiency in writing (2011 NAEP) is nothing short of alarming. To address this crisis, therefore, we can assume teachers are placing greater emphasis on writing instruction and increasing the frequency with which students write, yes? Actually, the answer nationwide is generally no; in fact, in far too many cases, students are writing less.

The reason is that writing (and the thinking that drives it) is a complex set of skills to learn—requiring ideation, outlining, drafting, and revision—and learning (and teaching) these skills is time-intensive. To help students navigate such complexity, ideally the teacher is involved at almost every step of the process; as any former or current student can attest, perhaps the most difficult aspect of writing is getting started; assembling one's thoughts into a coherent flow of logic is a close second.

What is it about a blank page (or screen) that evokes such fear in students? The answer is that it represents endless possibilities. For the rare few, such a clean slate is exciting; for the rest of us, it prompts something akin to mental paralysis. What's the point I'm trying to make? How can I support it? How should I order my ideas? The questions are many and daunting—and, for students of every ability, often enough to cause the fear to rise and the confidence to plummet. When that happens, the once-promising intellectual journey is over before it begins.

Enter the teacher. By conferencing with the student, she or he can ask targeted questions that help the student talk through the central idea, supporting logic, and other elements of the essay—eventually arriving at the outline needed to break free of the paralysis and craft an effective essay. It's the same process a personal tutor would follow—and one that, repeated often enough, can be followed on one's own.

But there is only one teacher and a class full of students. Because conferencing is such a time-intensive task, it's logistically challenging, if not impossible, for a teacher to go through this process with each student for even one writing assignment, let alone every assignment. Therein lies the problem: conferencing doesn't scale.

Past Attempts to Solve Problem

In an effort to address this problem, graphic organizers, dialectical notebooks, guided questions, and other tools have been introduced and adopted sporadically. Pedagogically sound and typically paper-based, they seek to provide students with a template for capturing and organizing their thoughts—in many cases, asking the same questions a teacher would.

Certainly, these tools represent a step forward from the blank page, but they lack the sustained intellectual engagement, grounded in critical thinking, that a one-on-one *conversation* between student and teacher facilitates. "One way to conceptualize the fundamental literacy practices is that they start with oral interaction and move students to the point at which written practices can substitute for oral equivalents."[1] In other words, it is easier to talk through an idea or argument than it is to articulate it in writing.

Based on recent research, introducing technology into this equation holds promise.

Using electronic means to mediate the brainstorming process has been proven successful in stimulating the generation of ideas.[2] Meanwhile, research on intelligent agents and bot research demonstrate that both can be scalable and useful assistants to learning[3][4]. Although conversational agents such as Siri, Alexa, and Google have become a daily part of our lives, they are not yet advanced to carry out a dialog or help in the learning process.[5]

Taken together, this research suggests there is an opportunity to harness many of these leading-edge technologies to achieve the benefits of the teacher-student conference on a large scale.

Introduction to Idea

FineTune's Writing Hero™ seeks to do just that. It's a concept anchored in two beliefs: the first is that what students dread about writing is not the writing itself, but being precise with their *thinking*; the second is that the greatest value in a teacher-student conference is the opportunity

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[1] Deane, P. , Sabatini, J. , Feng, G. , Sparks, J. , Song, Y. , Fowles, M. , O'Reilly, T. , Jueds, K. , Krovetz, R. and Foley, C. (2015), Key Practices in the English Language Arts (ELA): Linking Learning Theory, Assessment, and Instruction. ETS Research Report Series, 2015: 1-29. doi:10.1002/ets2.12063

[2] Dugosh, K. L., Paulus, P. B., Roland, E. J., & Yang, H.-C. (2000). Cognitive stimulation in brainstorming. *Journal of Personality and Social Psychology, 79*(5), 722-735. http://dx.doi.org/10.1037/0022-3514.79.5.722

[3] Chun-Hsiang Wang and Tsai-Yen Li. 2018. Design of an Intelligent Agent for Stimulating Brainstorming. In Proceedings of the 2018 10th International Conference on Machine Learning and Computing (ICMLC 2018). ACM, New York, NY, USA, 305-311. DOI: https://doi.org/10.1145/3195106.3195119

[4] Cole, Ron / Massaro, Dominic W. / de Villiers, Jacques / Rundle, Brian / Shobaki, Khaldoun / Wouters, Johan / Cohen, Michael / Baskow, Jonas / Stone, Patrick / Connors, Pamela / Tarachow, Alice / Solcher, Daniel (1999): "New tools for interactive speech and language training: Using animated conversational agents in the classroom of profoundly deaf children", 45-52 In MATISSE-1999.

[5] Ting-Hao Kenneth Huang, Walter S. Lasecki, Amos Azaria, Jeffrey P. Bigham. "Is there anything else I can help you with?": Challenges in Deploying an On-Demand Crowd-Powered Conversational Agent. In Proceedings of Conference on Human Computation & Crowdsourcing (HCOMP 2016), 2016, Austin, TX, USA

to talk through one's thoughts. Therefore, it seeks to improve students' ability to write effective essays by deliberately taking their focus *off* of writing at the outset of the process, shifting it instead to talking through their ideas—a concept grounded in research supporting "oral interaction" and the use of intelligent agents in the learning process.

Specifically, Writing Hero is a proposed service (i.e., plug-in), featuring two A.I.-driven agents, that could be integrated into WhatsApp, Alexa, Siri, Google Assistant and Google Docs. The first agent would enable students to brainstorm and organize their ideas for any writing task via a chatbot or conversational agent (e.g., Siri, Alexa, Google). The second agent would provide them with sentence-level feedback on their writing to ensure those ideas are communicated clearly.

The brainstorming agent will ask the student targeted questions in an effort to move her or him to articulate a main idea and then a line of reasoning to support it—resulting, ultimately, in a detailed outline comprised solely of the student's own ideas. Here is an example of what this interaction would entail (via chatbot or voice):

> *Student:* Hey, Google, open Writing Hero.
>
> *Writing Hero:* What are you writing today?
>
> *Student:* A persuasive essay.
>
> *Writing Hero:* Great! Is it based on a text?
>
> *Student:* No.
>
> *Writing Hero:* Okay, what's the assignment?
>
> *Student:* Are you in favor of or opposed to extending the school year? Take a position and defend it.
>
> *Writing Hero:* Okay, got it. Let's start with identifying your main idea...
>
> *{Writing Hero asks targeted questions—first, regarding the main idea, then supporting logic—to which the student responds.}*
>
> *Student:* Writing Hero, I'm ready to draft my essay.
>
> *Writing Hero:* Okay, I've emailed the outline to you.

Once the student has retrieved her outline, she's ready to write. So, she would open Google Docs and drafts her essay. When she has completed a draft, she would call up the second Writing Hero agent, which provides her with sentence-level feedback on her writing.

With that, the process is complete: an essay is ready for submission.

For all their complaints about writing, the reality is that students today write more on a daily basis than prior generations; however, they are doing so in the form of texts or social-media posts, not structured essays. The former, we think, represents a potential bridge to the latter, so

every aspect of the Writing Hero user experience (UX) will echo the digital environments in which students already live.

The writing of an essay and the manufacturing of a product may not, on the surface, seem to have much in common, but the metaphor fits: one's ideas are the raw materials; the outline is the blueprint; the rough draft is the prototype; the final draft is the finished product.

Up until now, the "intellectual manufacturing" of writing has been inefficient—involving antiquated practices, outdated tools, and a lot of manual labor. Writing Hero will streamline this entire process, automating much of it. What it will *not* do is think for the student; quite the opposite, actually: it will provide the scaffolding necessary to enable the students to give voice to their own ideas.

Feedback & Iteration Process

Based on the preliminary project plan, and assuming a start date of January 2020, FineTune estimates the following timeline for the development of Writing Hero:

- **June 2020:** Initial UX/UI designs complete; user testing begins.

- **September 2020:** Initial models for brainstorming and feedback tools built; large-scale data collection begins.

- **September 2021:** Brainstorming and feedback tools iterated and ready for year-long school-based testing; continued refinement of respective algorithms.

- **June 2022:** Beta version of Writing Hero is completed; end-to-end testing begins.

- **September 2022:** Writing Hero v1.0 is launched.

In all of its software development, FineTune employs a practice of rapid prototyping and user-based testing with all stakeholder groups to validate decisions or inform revisions.

Conclusion

Sometimes, the most innovative ideas are not entirely new; they take an existing activity and make it better, faster, or more efficient. At FineTune, we believe Writing Hero is one such idea. Research and classroom practice confirm the value of pre-writing conferences; research also confirms that much of the value in such conferences is derived from the opportunity to share and discuss one's ideas. Writing Hero applies this research, while scaling this practice—making it accessible by every student, regardless of circumstances.

Achieving this vision will involve technical complexity, particularly with respect to A.I., but with its existing team, its experience to date, and its access to additional domain expertise, FineTune is well-positioned to fulfill it.

At FineTune, we know that good thinkers make good writers. Writing Hero seeks to foster the former in order to develop the latter—and to do so in a format that today's students find engaging, not burdensome. Doing so reflects our belief that removing the emotional and intellectual impediments so common in the writing process can lead students at every level on a rewarding journey.