

Tome.gg Whitepaper

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Abstract—This whitepaper presents Tome.gg’s vision of hyper-personalized, inclusive, and equitable quality education and lifelong learning for all, starting with software engineers¹.

In section I, we discuss the state of education today, describe the educational challenges that software engineers face, and review the requirements and nature of personalized education. In section II, we formally define the problems and challenges that we aim to address. In section III, we describe in more detail the different stakeholders, customers, and beneficiaries of the community. In section IV, we introduce Tome.gg, its fundamental principles, and the community that Tome.gg aims to serve. In section V, we present applied theories and tooling built on the Tome.gg platform that addresses the discussed challenges.

The remaining sections VI and VII expound on our community principles and directions that lay the groundwork for the active projects within the community.

After reading this whitepaper, you will have a clear idea of who we are, what we are trying to solve, and the spaces in our community that you can go: to lurk, participate, play, learn, teach, or create.

Index Terms—education, technology, gaming, learning, growth

I. THE CURRENT STATE OF EDUCATION

A. The global scene

With the COVID19 pandemic, rising inflation rates, and resource shortages due to threats of war, poverty and education are gravely affected. The UN highlighted in their 2022 SDG Report [1] that the progress on global poverty rate has been reversed by 3 years, but could be as worse as poverty reduction efforts being reversed to as much as 9 years for low-income countries [2]. It is estimated that “147 million children missed more than half of their in-class instruction over the past two years [and this] generation of children could lose a combined total of \$17 trillion in lifetime earnings in present value” [3].

B. Traditional education and academia

With the lockdown caused by the pandemic, the modes of education changed rapidly to adapt to the needs of students and teachers. We saw technological advancements accelerate such as the necessity to evolve into using digital-first approaches, the mass adoption of learning management systems, the mass production of digital content sold and made accessible online such as books, PDFs, online video recordings of software

courses. Traditional education such as schools and universities eventually grew to adopt new communication channels such as online real-time classes, with audio and video data. With the movement to the digital space, both teachers and students learned the new rules of engagement and discovered challenges that did not exist pre-pandemic due to the evolution of doing lectures, engaging students, managing students’ attention, cheating, skipping classes, plagiarism and more. With the recent development of AI LLM tools such as ChatGPT, Bing Chat, Bard, and Llama, university administrators and professors find themselves in a challenging new educational landscape where the misuse of these widely accessible tools are threatening the growth, literacy, and numeracy of many young individuals.

C. Software Engineering and Professional Development

Educational material for software engineers can be classified into two categories² based on accessibility: online or offline.

Educational material accessible online:

- 1) Online-capable traditional educational institutions such as Higher Education Universities, or Research Institutes
- 2) Video learning platforms (Pluralsight, Udemy)
- 3) Certification platforms for proprietary tools (AWS, GCP, Azure)
- 4) Official public documentation of a tool, service, or application
- 5) Official discussion forum of a tool, service, or application (disqus)
- 6) Question and answer portals (e.g. Quora)
- 7) Question and answer portals that act as an error repository (e.g. Stack Overflow)
- 8) Public and private communities (Substack, newsletters, Discord)
- 9) Independent publishers (professional blogs)
- 10) Topic- or concept-focused websites (e.g. roadmap.sh, microservices.io)
- 11) Coaching and mentoring platforms (Sometimes paid, sometimes completely free supported by volunteers)
- 12) Public code repositories with discussions on issues and tickets

Educational material accessible offline:

- 1) Traditional universities, research institutes, or higher-education universities that offer degree programs in computer science, engineering, or data science

¹The paper is inclined to focus on software engineers as its primary beneficiaries because of their inclination to be learning-oriented and first-adopters of new technologies. However, the nature of technological evolution is that products and services are built rapidly to increase the wide adoption the new discoveries, which creates value accessible to all. This is further discussed and generalized in section III.

²The enumerated lists are not exhaustive or complete, but they describe the general state of available educational materials for software engineers as of the moment.

- 2) Events - in general, these can be workshops, seminars, master classes, hackathons, etc.
- 3) Events held by corporate-backed communities and organizations (Microsoft Philippines, Google Philippines)
- 4) Events held by independent communities and organizations generally serving software engineers, programmers, developers, hackers
- 5) University student-led organizations (Peer tutoring organizations)
- 6) Events held by community niches by tool, product, or practice (e.g. Raspberry Pi enthusiasts)

The above section describes the various entrypoints of a student in software engineering to enter into tech, whether through formal or informal educational platforms. A variety of different opportunities open up for the individual, such as general software development through programming, software infrastructure, architecture, security, product design, project management, software testing, and more.

D. AI-assisted tooling for educational purposes

We create a separate specific section for Large Language Models (LLMs) such as ChatGPT, Bing Chat, Bard, and Llama because of the immensity of value it delivers to enabling the accessibility of education especially for software engineering. With some of these AI tools trained on the vast majority of web data prior to 2021³, many of the public educational material enumerated above, such as public documentation of tools and services as well as code snippets, are part of the textual data that was processed. This enables these AI tools to provide somewhat sufficient answers when prompted questions about software code snippets, documentation, or concepts in software design and programming.

Working with LLMs opened up the new domain of study called Prompt Engineering, which is centered on 'prompts' which is the primary way of interacting with these text-based AI tools. This incredible innovation in technology enables software engineers and no-code or low-code developers to achieve greater capabilities that were previously inaccessible because understanding the programming languages, tools, and services required greater education, more discipline, or broader context in software engineering.

E. Adult development theories

With the focus of education of software engineers, we explore some theories of adult development, education and learning.

F. Personalized education

In the Philippines, some universities have a ratio of one (1) teacher to sixty (60) students. These ratios are not far from other developing countries.

³Need to cite paper on ChatGPT, other AI papers

II. PROBLEMS AND CHALLENGES

A. Rising costs of education

There are a variety of costs to education:

- 1) Financial costs - To advance oneself in their education, you sometimes must spend to get access to great teachers, educators, professors and also to acquire the credibility of system that provides that evaluation (e.g. credibility of a university). These organizations or corporations operate and accrue the reputation of effective evaluators in their fields (academe for university, proprietary software for large tech corporations like Amazon and Google).
- 2) Time and energy costs to find relevant content - The wide variety of options and different modes of teaching/learning is within the reach of software engineers, which sometimes makes it overwhelming and intimidating. Because some apprentices or junior software engineers are not familiar with the landscape in software engineering, they might spend much more time and energy in understanding things because they don't have a map to guide in their navigation. This is reinforced by the proliferation of YouTube trend of videos with titles like 'Day in a life of a software engineer' wherein software engineers simply talk about their daily life.
- 3) Context switching costs for personalization -

B. Property loss, theft, and attribution

III. COMMUNITY STAKEHOLDERS

The previous section described the apprenticeship model which uses the skill proficiency dimension to classify individuals. The following section uses the behavior dimension to classify stakeholders that we engage with in Tome.gg whether individuals or organizations.

A. Students, Learners, Apprentices

These are people who have an area of interest that they wish to learn about. This could be games, software engineering, medicine, law, or the like. Often times these are younger people, or fresh graduates, or people who are new to the workforce. In these cases, a young student would have the abundance of time, energy, interest, and curiosity.

B. Teachers, Educators, Mentors

These are people who have accumulated an abundance of knowledge in their field. This could be people who have spent roughly 5-10 years in their domain or industry. In these cases, they have an abundance of experience and context about their field.

C. Masters, Experts, PhDs

These are people who have not only acquired knowledge in their field for decades, but are actively involved in advancing the production and creation of new knowledge through research. This could be academic researchers, research scientists, or even e-sports gaming professionals that are crafting or

innovating the next meta of some video game. In these cases, they have an abundance of experience, context, and data about their field that enables them to theory craft, to perform pattern analysis, and to research new knowledge.

D. Consumers, Afficionados, Connoisseurs, Savants

These are people who may not be performers or creators in their field (e.g. cooking, creating YouTube videos, or creating art) but are well-versed in the taste and quality of creations. They spend a lot of their time consuming different kinds of things to ensure their evaluations and analysis remains sharp. In these cases, they have an abundance of observational or secondary experience in their field, and focus on enabling the accessibility of learning about theories and patterns that either they or masters have developed.

E. Creators, Curators, Performers

These are individuals who are at the center of their field, actively participating, and are directly involved in creating a new performance, developing a new creation, or remixing past things into something new. Some masters are also creators and performers, but not all creators are masters. In a similar regard, these people can be considered as major manufacturers or creators, whether in the digital or physical sense. In these cases, these individuals have an abundance of primary experience in their field and an immense abundance in their network, by having an incredible connection with their audiences or markets, or the partnerships they make.

F. Corporations, Organizations, Governments

These are organizations which operate at greater velocity as compared to individuals. Each organization has their own directions depending on what their objectives are. They have the great opportunity of funneling their resources into the causes that are important to them (e.g. profit, social impact, advocacies, inclusion) but with this immense power and influence comes also greater opportunity cost and risk. As such, they unfortunately cannot make as fast decisions as an individual might be able to, as they have people and systems that depend on them already that they risk endangering or losing. In these cases, organizations are abundant in their resources, financial credibility, brand identity (if any), networks, and assets.

IV. TOME.GG AND ITS PRINCIPLES

Every single person in the world is playing a game. Some play their game casually, while some play their game competitively. A person's game might be physical sports where the objective is to win based on the rules of the game. A person's game might be social interactions and their objective is to become popular with a huge following. A person's game might be business, and their objective is to make their numbers grow big. Everyone is playing a game.

Tome.gg is an educational and growth-oriented community that leverages lessons learned in games and applying them in one's personal and professional life. In machine learning under computer science, the concept of applying what

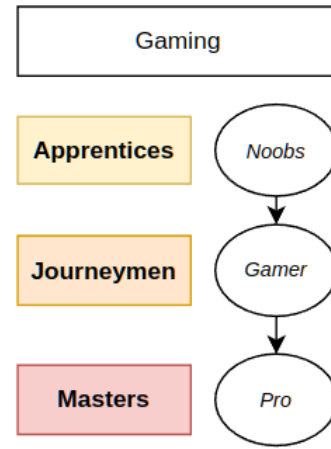


Fig. 1. In the gaming domain, the following terms are commonly used to refer to people in relation to their skill level.

was learned from one domain or problem to another is called transfer learning [5]. At Tome.gg, we use examples, theories, and concepts learned from games to explain and educate using analogies and comparisons. For example, we can see a model of apprenticeship [4] applied in the gaming domain that represents the various stages of learning: people become apprentices, journeymen, and masters.

Tome.gg primarily focuses on mid- to senior-level software engineers. However, this focus on the software engineering domain and the focus on engineers at a journeyman stage does not limit the opportunities offered to apprentices and masters. This focus does not restrict them from participating or contributing to this community. Everyone has a unique role to play in how to efficiently contribute in the global challenges in education, which we will discuss in section V.

The following section describes the stakeholders within and outside of the Tome.gg community.

V. CONTRIBUTION

A. Abbreviations and Acronyms

Define abbreviations and acronyms the first time they are used in the text, even after they have been defined in the abstract. Abbreviations such as IEEE, SI, MKS, CGS, ac, dc, and rms do not have to be defined. Do not use abbreviations in the title or heads unless they are unavoidable.

VI. PRINCIPLES AND MINDSETS

A. Inclusive education for all

B. Safety and freedom

C. Ownership and sovereignty

D. Openness and transparency

E. Lifelong learning

F. Sustainable growth

Let tech do the heavy lifting.

G. Pursuit of mastery and excellence

H. Actualizing one's dream

VII. COMMUNITY DIRECTIONS

A. Building the community

B. Building the tome.gg Map

C. Collaboratively building an open pool of knowledge

D. Collecting an open pool of knowledge

E. Figures and Tables

a) *Positioning Figures and Tables:* Place figures and tables at the top and bottom of columns. Avoid placing them in the middle of columns. Large figures and tables may span across both columns. Figure captions should be below the figures; table heads should appear above the tables. Insert figures and tables after they are cited in the text. Use the abbreviation “Fig. 2”, even at the beginning of a sentence.

TABLE I
TABLE TYPE STYLES

Table Head	Table Column Head		
	Table column subhead	Subhead	Subhead
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^aSample of a Table footnote.



Fig. 2. Example of a figure caption.

Figure Labels: Use 8 point Times New Roman for Figure labels. Use words rather than symbols or abbreviations when writing Figure axis labels to avoid confusing the reader. As an example, write the quantity “Magnetization”, or “Magnetization, M”, not just “M”. If including units in the label, present them within parentheses. Do not label axes only with units. In the example, write “Magnetization (A/m)” or “Magnetization {A[m(1)]}”, not just “A/m”. Do not label axes with a ratio of quantities and units. For example, write “Temperature (K)”, not “Temperature/K”.

ACKNOWLEDGMENT

The preferred spelling of the word “acknowledgment” in America is without an “e” after the “g”. Avoid the stilted expression “one of us (R. B. G.) thanks ...”. Instead, try “R. B. G. thanks...”. Put sponsor acknowledgments in the unnumbered footnote on the first page.

REFERENCES

Please number citations consecutively within brackets [1]. The sentence punctuation follows the bracket [2]. Refer simply to the reference number, as in [3]—do not use “Ref. [3]” or “reference [3]” except at the beginning of a sentence: “Reference [3] was the first ...”

Number footnotes separately in superscripts. Place the actual footnote at the bottom of the column in which it was cited. Do not put footnotes in the abstract or reference list. Use letters for table footnotes.

Unless there are six authors or more give all authors’ names; do not use “et al.”. Papers that have not been published, even if they have been submitted for publication, should be cited as “unpublished” [4]. Papers that have been accepted for publication should be cited as “in press” [5]. Capitalize only the first word in a paper title, except for proper nouns and element symbols.

For papers published in translation journals, please give the English citation first, followed by the original foreign-language citation [6].

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