Tome.gg Whitepaper

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Abstract

This whitepaper introduces Tome.gg , a platform for hyper-personalized education. The platform incorporates concepts from a variety of sources: (i) the modern nature of online communication, (ii) experiences in the tech industry (software engineering, tech and startups), (iii) psychology, education, and learning, (iv) and competitive gaming and e-sports (where majority of the youth now experience concepts of economics, mathematics, game theory, and strategy). The platform is driven initially with the focus on mentorships and apprenticeships for mid- to senior-level software engineers. This paper emphasizes the challenges encountered in professional development, ownership of intellectual property and growth data, and the unique opportunity that mentorship offers to bring value both to mentors and apprentices. The paper envisions a transformation on the educational landscape beginning with software engineers, in the pursuit of an inclusive learning environment accessible to all.

In section I, the current state of education, software engineering challenges, and personalized education characteristics are discussed. Section II defines the problems and challenges addressed by the platform. Section III describes the platform's stakeholders, customers, and beneficiaries. Section IV introduces Tome.gg, its vision, and the target community. Finally, section V presents the tools and services provided by the Tome.gg platform for users and contributors.

Index Terms

learning, growth, personalized education, technology, software engineering, apprenticeship, mentorship, knowledge management

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 (and hybrid variants), with audio and video data. With the movement to the digital space, both teachers and students learned the new rules of engagement in this digital learning environment and discovered challenges that were minimally experienced pre-pandemic in activities which evolved such as lectures, engaging students in presentations, 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 sources for software engineers can be classified into two categories based on mode of access: online or offline. The enumerated list below is neither exhaustive nor complete, but it provides a general idea of the current available educational sources and materials for software engineers.

Educational sources 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 error repositories and indexes (e.g. Stack Overflow)
8) Public and private communities (Substack, newsletters, Discord, Mastodon)
9) Independent publishers (professional blogs)
10) Topic- or concept-focused websites (e.g. microservices.io, regex101.com, roadmap.sh)
11) Coaching and mentoring platforms (paid, free services)
12) Public code repositories with discussions on issues and tickets

Educational sources accessible offline:

1) Traditional universities, research institutes, or higher-education universities that offer degree programs in computer science, engineering, or data science
2) Workshops and Bootcamps - A hands-on learning program for a skill or tool.
3) Seminars and lectures - Sessions that provide instruction and information, but often uni-directional in teaching.
4) Master classes - Learning environments facilitated by experts where students take a greater role in practice and training.
5) Hackathons - A rapid activity to generate MVPs or proof of concepts intended to innovate and create value, and connect with investors, mentors, and co-collaborators.
6) Casual meets, unconferences, coffee chats

Some of the events mentioned above can also be classified by organizer: there are as corporate-backed organizations (Microsoft Philippines, Google Philippines), University student-led organizations (Peer tutoring orgs), Independent communities and organizations niches by tool, product, or practice (e.g. Raspberry Pi enthusiasts, Golang Philippines, Node.js Philippines, Hasura community).

The above section describes the various entrypoints for someone learning technology (whether student or career shifter) whether through formal or informal educational sources. A person completely new to the industry has all of these options available to them, which can be challenging and intimidating to navigate and discern which areas are appropriate to their current level of interest, capability, commitment, and capacity.

D. AI-assisted tooling for educational purposes

The mass-market availability of AI Large Language Models (LLMs) such as ChatGPT, Bing Chat, Bard, and Llama enables people to access vast amounts of information and reasoning capabilities through natural languages (e.g., English) as an interface. These AI tools are trained on the majority of web data prior to 2021[1], which include publicly-available online educational material such as public documentation of tools, services, APIs, and source code.

Specifically for software engineers, these tools provide great answer approximations not just for generating code simply from a prompt, but also for explaining intimidating concepts.

However, there are limitations to these AI models. For instance, AIs trained on older data may generate outdated or invalid responses due to changes in the field since the last training. Additionally, responses can sometimes produce AI hallucinations, which may be caused by statistical biases or inherent biases in the trained data, such as myths, gossip, or human misconceptions.

Working with LLMs has opened up a new domain of study called Prompt Engineering, which focuses on 'prompts,' the primary way of interacting with text-based AI tools. This groundbreaking innovation in technology enables software engineers and no-code or low-code developers to achieve greater capabilities that were previously inaccessible due to the required understanding of programming languages, tools, and services, which demanded more education, 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.

II. Problems and Challenges

A. Barriers to education

There are a variety of barriers to education:

1) Financial costs - Quality education sometimes require a large sum of money to access great teachers, educators, professors. In 2021 at one of the best universities to study technology and software engineering, Massachusetts Institute of Technology (MIT) provided estimates of student charges for an undergraduate course at around 77,020.00 USD: 72.5% of that amount

[1]Need to cite paper on ChatGPT, other AI papers

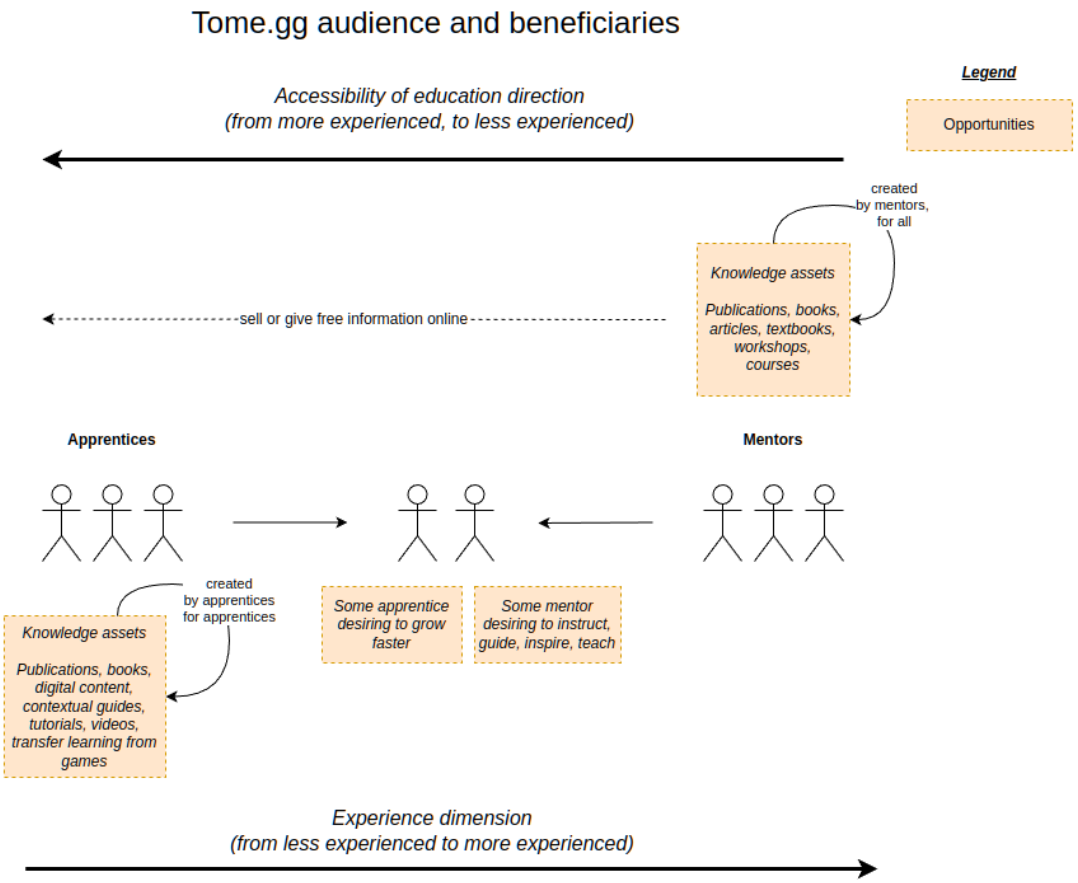

Fig. 1. Example caption.

is intended for tuition (estimated at 55,878.00 USD) and 27.5% is for other costs like books, on-campus room & board (estimated at 21,142.00 USD) [8]. From 2016 to 2021, MIT's tuition increased by 15.3%, rising from 48,452.00 USD to 55,878.00 USD. [8].

A non-exhaustive list of the large expenses that universities spend on are: (a) salaries for administrators, professors, researchers, and curriculum designers, (b) quality school equipment including maintenance and access to in-person libraries and electronic libraries, (c) instructional costs to deliver the academic programs to the students, (d) research and collaborations with industry partners to understand the growing demands of the job market. A recent graduate of a software engineering degree commonly has the goal of acquiring a good, reliable job that opens them to a broad selection of economic and growth opportunities. Higher education institutions (HEIs) like MIT respond by providing career advising services, hosting recruiter activities, and providing networking opportunities with established alumni working in different companies, and more. For these reasons, many parents and students are willing to spend large amounts of money and put their trust in these HEIs.

to have a well-organized 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) Signal to noise - With the broad selection of educational materials accessible to software engineers enumerated in I-C, the search for learning content that is appropriate for one's learning can become overwhelming and intimidating.

Apprentices or junior software engineers may not be familiar yet with terminologies and concepts in software engineering to be able to quickly skim research abstracts or blog articles. In their inexperience, they might find themselves spending more time and energy in comprehending things with a 0 to 100% expectation 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) Energy costs -
4) Opportunity costs -
5) Personalization costs - There is a wide variety of options and modes of teaching/learning available online. Some categorize the modes of learning as: visual, auditory, kinesthetic [2]. These learning preferences are not mutually exclusive (i.e. you only learn effectively in one form). It is more likely that a person has a mixed preference of the different learning modalities. Aside from the categorical preference in mod of teaching, there are also other aspects of learning such as frequency of learning (e.g. Does the student prefer visual learning very rarely but auditory learning very frequently?), transition speed (e.g. how quickly do we transition from one mode to the other), and transition style (e.g. what's the effective way for these modalities to transition, based on the student's preference in learning?). When receiving educational material that does not match your preference in any of these aspects, significant friction can occur that prevents a learner from advancing and can trigger feelings of being overwhelmed and intimidated.
6) 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.

[2]citation needed

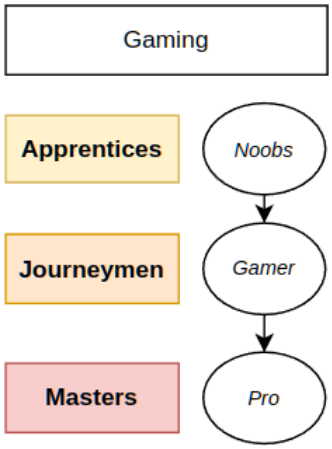

Fig. 2. In the gaming domain, the following terms are commonly used to refer to people in relation to their skill level.

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

The 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.

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 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. 3", 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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[a]Sample of a Table footnote.

Fig. 3. 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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[2] United Nations, "Poverty - United Nations Sustainable Development". Accessed February 5, 2023 from https://www.un.org/sustainabledevelopment/poverty/.

[3] United Nations, "Education - United Nations Sustainable Development". Accessed February 5, 2023 from https://www.un.org/sustainabledevelopment/education/.

[4] I need a reference for the apprenticeship model.

[5] I need a reference for transfer learning.

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