

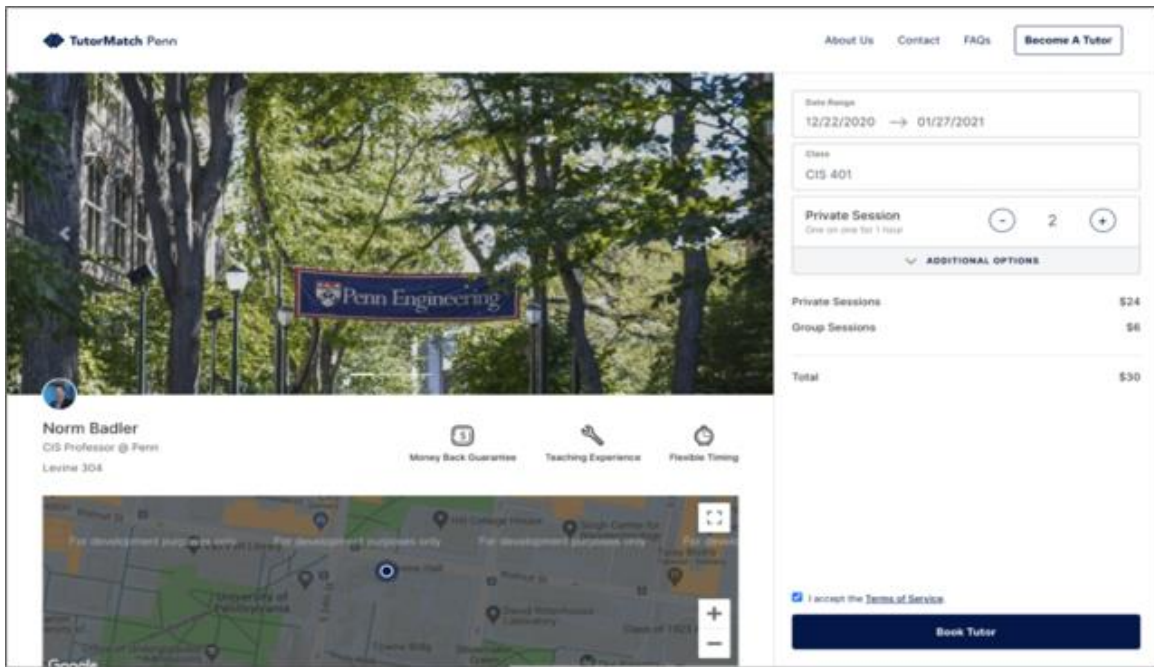
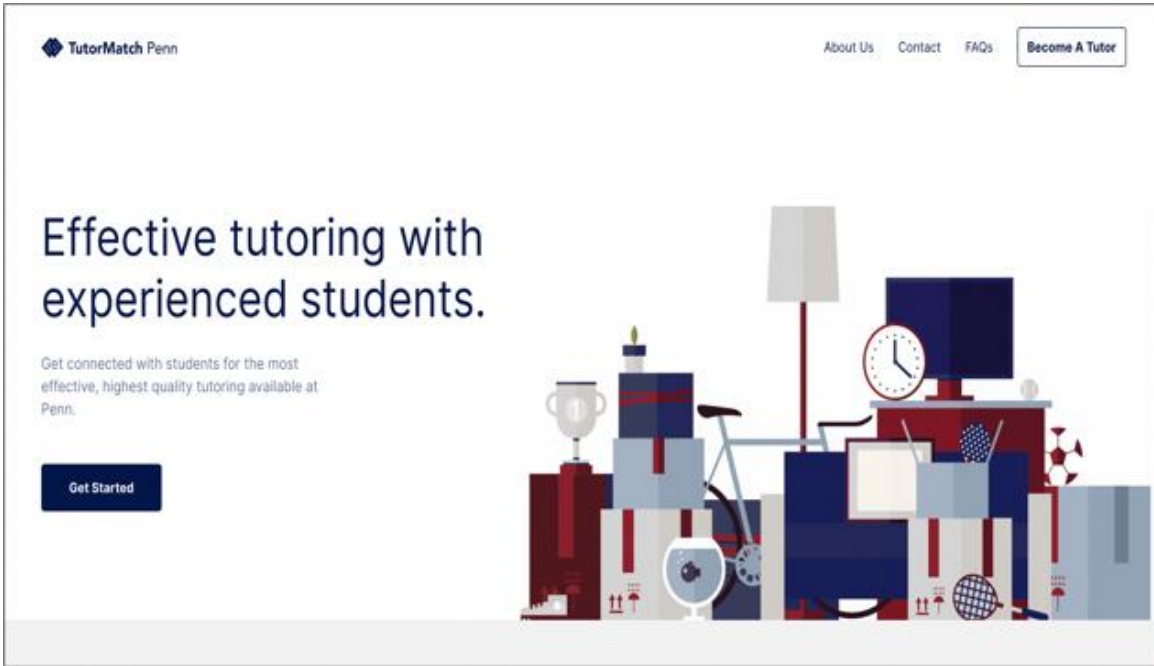
PENN TUTOR MATCH

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What is Penn Tutor Match?

Penn Tutor Match is essentially an application that connects Penn students to student tutors at Penn. Currently, there is a small fee that students must pay tutors per session. Below, we see a snapshot of the platform, with the home page that allows a student to get started and sign up, and then to the right a picture of the platform once you are matched to a tutor for that class.



The platform provides the user with a relatively frictionless, easy sign up process. Upon

landing on the home page, a user can click “get started” to start the signup process. This takes the user to the sign-up page, where the user types what class he/she needs help with, how many sessions the user needs, and provides contact information such as his/her phone number and email for communication purposes.

Filling out this information will match the user to the best fit tutor for the user for that particular class, based on similarity of schedules, ratings, and keyword matching. After agreeing to the terms of service outlined on the platform, the user will be navigated to a confirmation page, after which the user will be sent a confirmation email and contact information for the tutor, so that the user can contact the tutor to coordinate prior to the meetup.

Technology

Penn Tutor Match uses GraphQL for its backend and React for frontend. React is one of the most popular frontend tools, and we used that out of convenience and familiarity.

GraphQL is an open-source data query and manipulation language for APIs, and a runtime for fulfilling queries with existing data. GraphQL was developed internally by Facebook in 2012 before being publicly released in 2015. We use GraphQL to fetch data on tutors that meet specific criteria requested by students.

We feel that GraphQL is the most efficient query language for this use case. We thought we might delve into why we used GraphQL vs REST. For one, GraphQL is better at fetching data than REST. A single query to the GraphQL server that includes the concrete data requirements returns a JSON object where every requirement is fulfilled, whereas REST would have separate endpoints for tutor’s name, office, contact information, and description. There is also more frontend flexibility. With GraphQL, since clients specify exact data requirements, no backend changes need to be made. REST APIs usually structure endpoints according to the views in the app, allowing the client to get all the information for a view by accessing the corresponding endpoint. The drawback is that with every UI change, there is a high risk that more or less data is required than before, and the backend will have to be adjusted to account for the new data requirements. In essence, GraphQL is more efficient and allows for more flexibility. In terms of tradeoffs, GraphQL adds more complexity in terms of types, queries, mutators, resolvers, and high-order components, so there is a lot in terms of backend maintenance.

GraphQL versus REST

	GraphQL	REST
1 Data Fetching	<ul style="list-style-type: none"> A single query to the GraphQL server returns a JSON object where every requirement is fulfilled 	<ul style="list-style-type: none"> Would typically gather the data by accessing multiple endpoints Over and under-fetching problems due to endpoints that return fixed data structures
2 Frontend Flexibility	<ul style="list-style-type: none"> Changes on client-side can be made without changes to server. 	<ul style="list-style-type: none"> REST APIs usually structure endpoints according to the views in the app With every UI change, there is a high risk that more/less data is required than before

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GraphQL allows for more flexibility and efficiency

We also wanted to delve into our matching algorithm to match tutors with students. Given the nature of our platform, we needed an algorithm to match students to tutors, based on traits provided by both the student and the tutor. Our final algorithm utilizes pre trained word2vec embeddings and the cosine distance between them to measure similarity between the descriptions of the classes tutors can teach and the descriptions of what students need. We then filter to ensure that the students and tutors have time during the week that they can both meet.

Need and value proposition

Students are looking for affordable, personalized guidance in their college classes. This application provides Penn students with an easy, frictionless way to sign up for tutoring sessions at flexible dates and times throughout the week. Although Weingarten exists, right now there is a lack of clarity on how to find a tutor through Penn's system, and the signup process through Penn's system is rather tedious. Moreover, Weingarten has a fixed schedule, from 9-5 on weekdays only. With Penn Tutor Match, there is more flexibility in timing a session, which offers more convenience for students.

Stakeholders

Students: Students are the main customers, and they are invested in this site to help them learn material for classes. They want to make sure that there are tutors available on this site for

the particular courses that they need help with

Tutors: Tutors are suppliers in a way, as without them, there would be no services to offer. They want to make sure that there are students seeking help for the particular courses they can teach, so that they can make some income

Our team (website owners): We are the internal stakeholders who want to see both suppliers and customers thrive. If so, we are contributing positively to the Penn environment.

Competitors: Weingarten and the TA market are clear competitors to this platform – if Penn Tutor match sees success, these two competitors will see less business; therefore, they will inevitably be interested in our performance.

Market Opportunity

Our target market is currently Penn students so that we can focus on a familiar base and grow from there. In terms of competitors, Weingarten is our main competitor; however it is a less flexible alternative, as it only open during business hours during the week, while our platform allows tutors and tutees to pick from a larger spread of times. Tutors also make the same, if not more income from our platform. We also have a lower-friction sign up process. In terms of the TA market, we believe that the TA market serves different needs, related to more homework specific help, while tutoring helps with conceptual help. Moreover, TAs spread their time between many more students, making their time with students less personalized, which is where tutoring comes in with the extra help.

In the coming months, we plan to extend our business to Drexel and Temple; these colleges are in close proximity for easy monitoring. A worry that we have is our name – Penn Tutor Match might deter other colleges from using our platform. We might need to consider changing our platform to “College Tutor Match”, or simply “Tutor Match”.

Customer Segments

There aren't too many customer segments to consider; we can usually just generalize them to college students who are in the College, Engineering, Nursing, and Wharton. In other colleges, something to keep in mind is that there are different class tags for different colleges, so we may need to start matching on generalized subjects like “Computer Systems”.

Size and Growth of Market

The market is currently limited to Penn students (both Undergraduate and Graduate students). In terms of market growth, we could expand this to other schools (with each school having its own personalized platform for specific classes), starting with Drexel and Temple and moving radially outward. There are around 20M college students in the country, and we have around 20K college students at Penn. There is thus a lot of whitespace that we can tap.

Competition

The Penn Tutoring Service that currently exists (Weingarten) as well as the TA market. I have covered both previously, but Penn Tutor Match is more accessible to the student market because of increased flexibility. In addition, Penn Tutor Match is more personalized, and offers specific help rather than generalized conceptual help.

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Cost

Costs are minimal and fixed and are only related to maintenance of the site. We also need to pay tutors per session. Sendgrid (the service we use to send confirmation receipts) is free for up to 100 emails a month. For the time being, we will assume that we do not need to pay anything out of pocket for Sendgrid. We also use a Google Maps API on our platform. The API charges us \$7 per 1000 interactions with the map, which is also a very small cost relative to the revenue generated from booking a singular session. Last, but not least, we have the costs associated with hosting the database, which are around \$2/month. Spread out per session, this is again quite minimal of a cost.

Revenue Model

We currently think that \$12 per session is a reasonable price, but next semester we will do some analysis on willingness to pay to triangulate a more reasonable per session price, if one exists. Essentially, we plan on taking a cut (around \$1 or \$2) out of each session payment as revenue. We could also include ads, but a big selling point of our platform is its design, and we don't want to sacrifice the aesthetic for extra revenue.

If we look forward to the next several years, if we expect to have 1000 completed sessions by the end of this year and see an increase of 30% in the number of sessions each year for the next 5 years, we have a net gain of around \$3 per session (\$8 goes to the tutor, and there is around \$1 of maintenance costs). If we discount cash flows for the next five years at a discount rate of 6.8% (Chegg's WACC, given that Chegg is a comparable), we see an NPV of \$21,622.6 in the next 5 years. This is a moderate case; we expect to grow at a faster rate than 30% in the next 5 years.

	DCF					30%
	2020	2021	2022	2023	2024	
No. Sessions	1000	1300	1690	2197	2856.1	
Revenue	12000	15600	20280	26364	34273.2	
Less: Payment to Tutor	8000	10400	13520	17576	22848.8	
Net Revenue Less Salary	4000	5200	6760	8788	11424.4	
Less: Website Maintenance	1000	1300	1690	2197	2856.1	
Gross Profit	3000	3900	5070	6591	8568.3	
NPV	\$21,622.60					

Features

1. Tutors / students can sign up for this service
2. Students can register which classes they need help with, how many sessions they would like, and at what intervals they would like their sessions; tutors can likewise specify classes and availability
3. Secure Stripe payment process
4. Email Verification through Sendgrid
5. Zoom integration to adapt to COVID-19 regulations
6. Integrated Google Maps API for students and tutors to agree upon a meeting place
7. Platform will match students to tutors that fit their needs; students can select a tutor and confirm a meeting time and place

