Lab 1 – AskMissy Product Description

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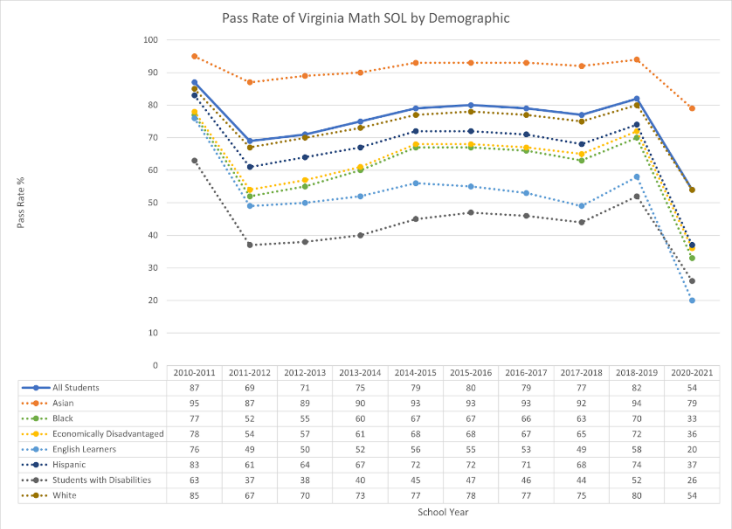
1 Introduction

Within our current society getting students to read is a difficult problem to tackle. This problem has only gotten more difficult as students have recently been transitioning into the classroom through virtual means, with the onset of the recent COVID-19 pandemic. This lack of reading presents a large problem in modern society as reading influences numerous other subjects and student's grades or performance with them. The problem of lack of reading due to difficulty finding resources can be apparent through SOL scores that have been gathered. These SOL scores, seen in Figure 1, show that students have been largely underperforming due to the effects that COVID-19 had on the populace, and the implementation of online learning.



	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2020-2021
All Students	87	69	71	75	79	80	79	77	82	54
Asian	95	87	89	90	93	93	93	92	94	79
Black	77	52	55	60	67	67	66	63	70	33
Economically Disadvantaged	78	54	57	61	68	68	67	65	72	36
English Learners	76	49	50	52	56	55	53	49	58	20
Hispanic	83	61	64	67	72	72	71	68	74	37
Students with Disabilities	63	37	38	40	45	47	46	44	52	26
White	85	67	70	73	77	78	77	75	80	54

Figure 1: Math SOL by Year. (Virginia Department of Education, 2021)

The lack of resources available for search, either by teacher or student, have greatly impacted interest in learning, as well as the lower SOL scores is a great problem that needs to be fixed in modern society if we wish to better help our school systems. Through this line of thought, where COVID-19 affects reading and thus effects the SOL scores of students and their given schools, we can see that a solution to the problem, that students' performances are

non-optimized due to this lack of materials and resources available to them through online learning, needs to be presented. This is where AskMissy comes into the picture.

The AskMissy will help its users, primarily being users confined to a school system, to find materials and resources necessary to bridge the gap between conventional and virtual learning for a more personalized experience for each user. The AskMissy solution will be a web application that finds resources for its users, specific to be personalized based on their preferences as well as feedback they give on a given resource. AskMissy will primarily be intended for middle to high school students, or grades 6-12, as we believe they would best benefit from this resource. AskMissy will be implementing a machine learning algorithm to allow us to better recommend what a given user may enjoy based on their user profiles and their previous feedback on resources that AskMissy had found. The software will also be able to have teachers and librarians utilize their lesson plans to have a resource recommended to students for their specific lesson plans that they have.

2 Product Description

AskMissy will be a software application intended for the purposes of better recommending of resources for given users and allowing teachers and librarians to better have resources entailed to specific lesson plans for students. It is intended to be a web-based application, available with only internet access, and will utilize machine learning algorithms to allow better future recommendations for users as well as an ever-learning software that adapts based on each specific user. The primary goal in creating AskMissy is to improve resource finding capabilities for students, teachers, and librarians. A secondary goal that is hoped to be

achieved as a result of the first goal, is that we hope that this software will allow better SOL scores and SOL preparation in the future for students. We also hope that the SOL preparation eventually extends to the teachers and librarians, as they are also a crucial aspect of student SOL preparation and finding adequate resources for their students is a priority for the software.

2.1 Key Product Features and Capabilities

The initial prospect of AskMissy will be that the main functions of the software will be placed inside of a school system and will be accessible via web application to users that would have valid school IDs, both inside and outside of the actual school place's network.

Authentication and user differentiation is a large aspect of the AskMissy software. Non-registered users, or guests, within the AskMissy system will be allowed to access the system, though only to a limited extent. This limited extent will only be a basic search functionality, similar to searching a normal library database, as well as the ability to attempt to create a registered profile within the system. This will allow us to reduce the risk of a potential 'bad' user from ruining ratings or algorithm searches/tags within AskMissy if they are not the intended audience of the program. Registered users on the other hand will have access to the AskMissy system and its search algorithms and feedback algorithms. The authentication of these users, as described previously, will be done using school IDs with general ease since the application would be placed and positioned within a school system. These registered users are broken down into students, teachers, librarians, and administrators, each with differing degrees of permissions and capabilities.

Students will have access to the AskMissy search algorithm in order to find resources personalized to them. They will also have the ability to share resources with other users on the platform, such as sharing a book that was recommended to them by the algorithm to another student or a teacher. They will also have the ability to message higher-tier users, such as teachers. This message functionality will have the primary intent of being to ask for a resource that is not available in the current library for resource requests, or by asking teachers or librarians for specific resources that they may be interested in. The students will also have limited access within the group or courses that they are in, such as joining, leaving or accessing reviews from the teachers who are the owners of the group/course.

Teachers will be a higher-tier user than students and will thus have all the permissions that a student would have as well as others. These other permissions include receiving resource requests from students, sending resource requests to librarians, and course group creation and management. The management of course groups will also allow them to remove students from their course group and will allow them to have access to student's reviews of resources that are made available within their course group. Teachers will also have a lesson plan creation aspect to their permissions and will be able to create lesson plans with specific resources attached to them to allow for easy shareability with other teachers or students.

Librarians will have access to all student and teacher features, except the teacher ability to make and manage a course group. The librarian does not have a course group, so they will instead be able to create and manage a school group in a similar manner, which will contain students, teachers, and courses. Librarians will also have the ability to maintain and update the school library inventory within the AskMissy program, if inconsistencies arise within the system,

to allow the program to remain as current as possible. They will also be able to manage lists of requests from teachers with a priority order list for resources that have been requested by students or teachers. They are also able to contact administrators for technical support that they will have over the system.

Administrators are our last user type in our real-world product of AskMissy and will have all accesses of the previous user types mentioned. The main role and features of the administrators are to ensure data integrity and maintain databases within the program and will thus be given access to all user profiles and metadata and will be allowed limited database management capabilities. They will also be able to authorize librarians to create school groups within the system and contact the actual administrators of the school for data requests.

Feedback is another major function and aspect of the AskMissy solution. Feedback of a given source will be requested by the software after that resource was recommended to the user. The prompt will appear asking for the user's feedback, this feedback will then be fed into our machine learning algorithm to better our results in the future. It is important to note that within our system, overall ratings of a resource will not actually affect a user's personal profile recommendations, thus keeping our initial idea of personalized searching intact.

The databases within AskMissy will be the primary concern aside from machine learning. The school database comprising the school library and other resources will be available with integration within the school system by AskMissy and these databases will be managed by the librarian and administrator user types, as discussed previously. External databases will also be a feature of AskMissy and will be accessed by web scraping algorithms and APIs to allow for

more resources to be able to recommend to prospecting users. There will also of course be the AskMissy user profile database which will store all of our users and their preferences and tags that they prefer and are leaning towards when looking for resources.

The other aspect of AskMissy that will set us apart from any potential competition, would be the machine learning algorithm that will be implemented. Our machine learning algorithm intends to allow for personalized search results found for each specific user based on the data acquired from account creation, and feedback received about past recommended resources from AskMissy. This machine learning algorithm will allow our product to constantly be growing along with its users for a better experience. It is intended for AskMissy to be better each time we use it, meaning more use of the software leads to better results for its users.

2.2 Major Components (Hardware/Software)

AskMissy is made up of both front-end user interfaces and backend servers, databases, and components. Figure 2 shows the major functional component diagram, or MFCD, for AskMissy, which will detail the large portions, in an abstract sense, of the software and the moving parts that make up the AskMissy application.

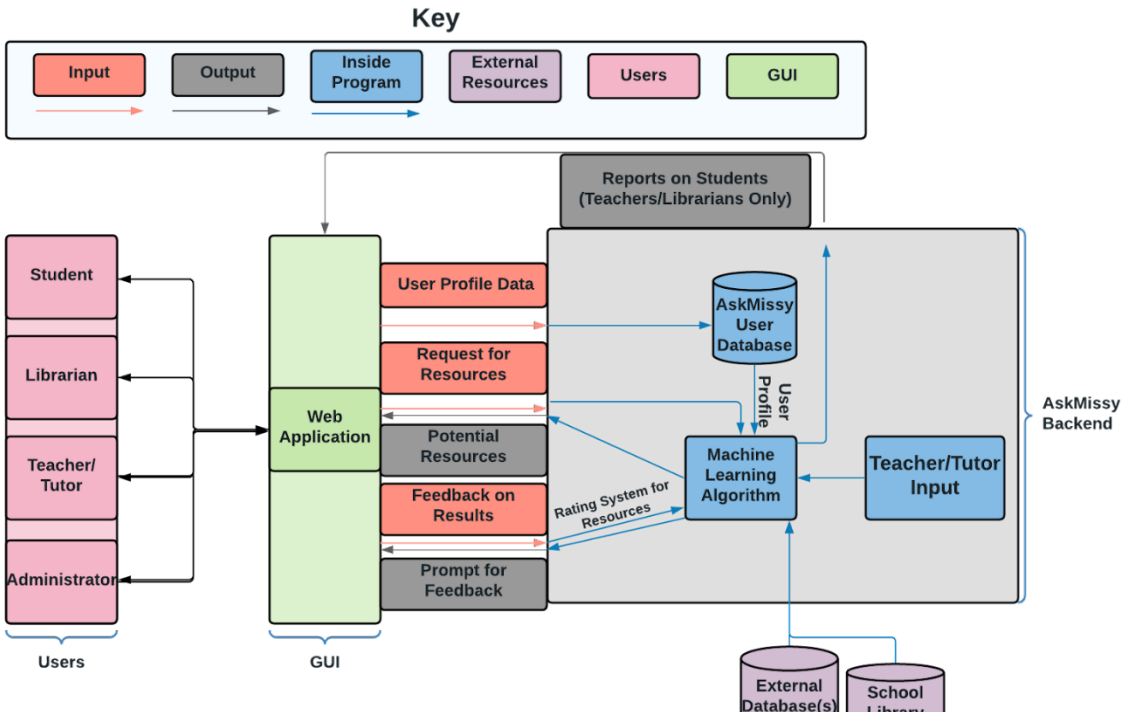


Figure 2: AskMissy Major Functional Component Diagram

AskMissy needs various hardware in order to run effectively. The hardware to access the AskMissy application, however, only needs a device capable of accessing the internet, as it will be a web application. In terms of the servers needed to properly run the AskMissy program and application, we need a bit more. The list of servers that would be needed would be a main frontend server, a main backend server, a web scraping backend server, a machine learning backend server, and a server dedicated for our main database.

There are also a number of software requirements for AskMissy. The frontend software will be programmed in the languages of HTML5, CSS3, and JavaScript, to allow us to interface as a web application effectively. The backend will primarily be programmed using the Python language, due to its use and extensive machine learning based libraries available for use. The IDE that will be primarily used for the AskMissy development will be Microsoft Visual Studio Code and automatic navigation libraries can be seen through the use of PyAutoGUI. The repository that the development team will use to keep up to date on the current build of the project will be GitLab, allowing us to update and fork the project when necessary. Our databases within AskMissy will be using standard choices such as Amazon RDS, MySQL, and connector/python. Machine learning, which is a large part of the backend, will be programmed using Python, specifically using the library of scikit-learn to properly utilize machine learning based functions. Our natural language processing algorithm will also be programmed using Python as well.

3 Identification of Case Study

The AskMissy product is intended for students, teachers, and librarians to use, and is primarily intended for middle and high school students between grades 6-12. The product is initially thought to improve SOL scores for students and schools in the future but can be expanded on its intended use in the future as well. AskMissy will be intended, in general, for assisting students in searching for personalized resources to make their experience with gathering resources more enjoyable and particularly making it pertain to their interests, making them more invested. The AskMissy program will also be used for teachers and librarians in order to enable them to find appropriate resources for themselves, their lessons, and their students.

As AskMissy grows, in addition to assisting these students, teachers, and librarians with their academic careers, will also have a potential to benefit resource publishers, as they would get more sale of their resources if requested resources may not be available in the school library. The software will also help students' parents, as they will also benefit from their child's success and accomplishments.

4 Glossary

Administrator: A user who is responsible for managing a majority of AskMissy's working data.

Agile: Set of frameworks and practices where solutions evolve through collaboration between self-organizing and cross-functional teams.

AskMissy: A software/web application that will help users find more relevant resources.

API: Application Programming Interface.

Data Retention: The continued storage of an organization's data for compliance or business reasons.

Database: Structured data held in a computer.

Economically Disadvantaged: A student in Virginia is considered economically disadvantaged if the student:

- Is eligible for Free/Reduced Meals
- Receives TANF, or
- Is eligible for Medicaid

Exact Match Search: A search for a single specific resource.

File Server: Controls access to separately stored files.

Guest: A user who is not a student, teacher, librarian, or administrator; has limited access to the AskMissy program.

Librarian: Responsible for managing the library's inventory/database, communicating with teachers and students.

Personal Learning: An educational approach that aims to customize learning for each user's strengths, needs, skills, and interests.

Student: A person studying at a K-12 education institution in need of reliable resources.

Teacher: A person who helps students (K-12) to acquire knowledge; Responsible for making plans, managing students' groups/communication.

Temporary Assistance for Needy Families (TANF): Provides eligible families with a monthly cash payment to meet their basic needs.

Tester: Responsible for designing and conducting testing suites for usability testing.

User: A user will be anyone using the AskMissy Interface and will fall into the category of a guest, student, teacher/mentor, librarian, or administrator.

Web Scraping: Extracting/scraping data from websites.

Web Server: A computer that runs websites.

Windows: Series of operating systems developed by Microsoft.

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