Lab 1 – AskMissy Product Description

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1 Introduction

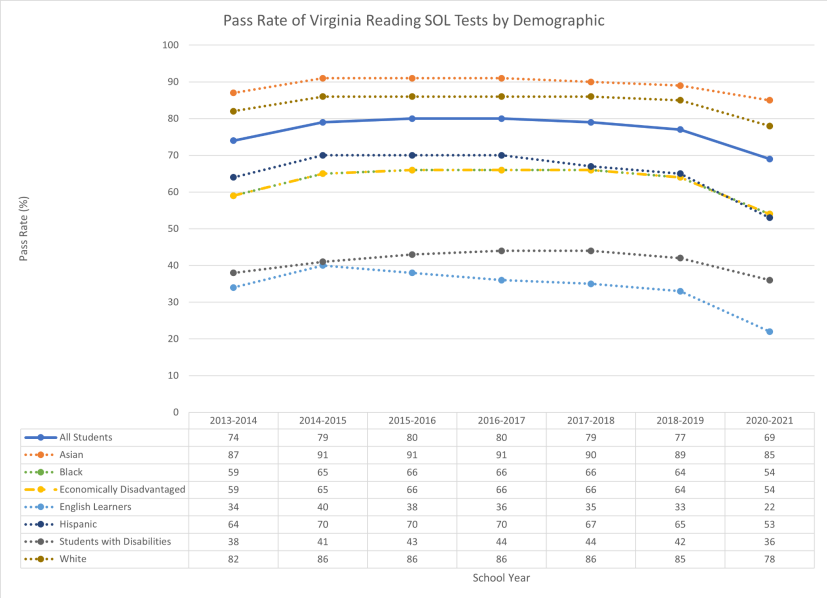
Societal Problem

Schools and students are losing resources vital to learning. Without those resources, it becomes increasingly difficult for the students to find those resources for their classes. With limited knowledge of how to search for desired resources because of the lack of accessibility, student's underperform on SOLs, or Standards of Learning.

Standards of Learning measures the learning of students in English, mathematics, history, and science and determines a school's accreditation and class placement of students. Teachers need better access to resources to refresh and modernize learning for students that struggle with learning.

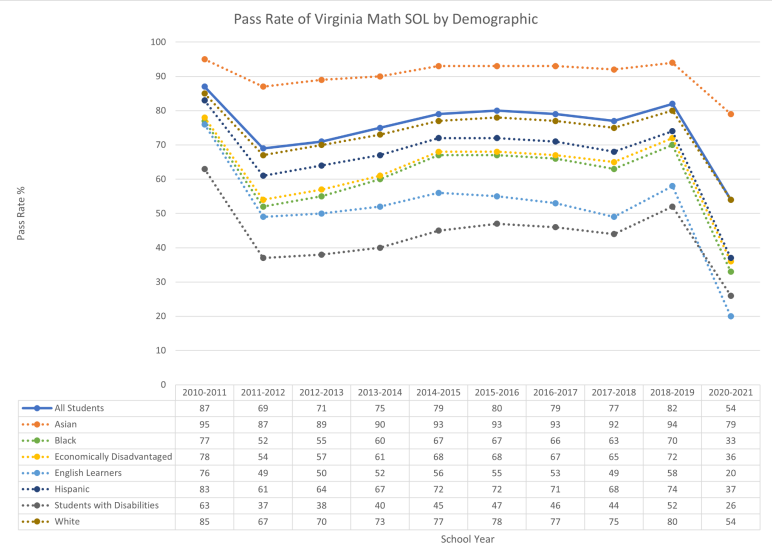
Teachers need access to these supplemental resources to not only bring underrepresented sources more attention and exposure, but also introduce students to new and refreshing takes on old ideas and even new ideas. Direct teacher access will allow them to connect with what students are currently reading and have interest in to better tailor their teaching plans.

Figure 1:



	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2020-2021
All Students	74	79	80	80	79	77	69
Asian	87	91	91	91	90	89	85
Black	59	65	66	66	66	64	54
Economically Disadvantaged	59	65	66	66	66	64	54
English Learners	34	40	38	36	35	33	22
Hispanic	64	70	70	70	67	65	53
Students with Disabilities	38	41	43	44	44	42	36
White	82	86	86	86	86	85	78

Figure 2:



	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

Students face many struggles in their pursuit of learning. Alongside time management and personal roadblocks, a common struggle is finding resources able to aid and reference their assignments. This is evident as SOL pass rates have gone down an average of 9% for all students with a more evident decrease at 11% for minority and low-income students.

Student performance is unoptimized due to a lack of materials tailored to their learning preferences. The AskMissy software application will help users find the resources necessary for them to bridge the gap between conventional and digital learning for a more personalized learning experience.

Solution - AskMissy

AskMissy will take the foundation of knowledge, being books, and expand outward to all types of resources and modernize how users access what they need and like in order to perform

academically, with a focus on SOLs. This software application will help users find the resources necessary for them to bridge the gap between conventional and digital learning for a more personalized experience.

AskMissy looks for resources about the user; filtering results on books from a wide range of topics based on the user's preferences. Each resource found will provide statistics; summary, ISBN for books, reviews/ratings and tags on resource content. The AskMissy subcategory search tool allows the ability to search for specific subcategories about nonfiction resources. This also allows users to filter through difficulty levels of the text within the resources. Users will be able to make personalized profiles with the ability to make them private or public.

AskMissy will focus on middle and high school students, grades 6-12, in allowing integrated access to school and personal resources using machine learning. To further AskMissy's integration for students, AskMissy includes the ability for teachers to upload lesson plans for their students.

2 Product Description

AskMissy Goals

AskMissy is a web-based software application focused on users being able to efficiently search for resources pertaining to lesson plans established by teachers and librarians. Machine learning algorithms are used to find resources based on the user's interactions and recommend resources best suited to the user's needs.

With machine learning algorithms, AskMissy will improve resource finding capabilities for students, teachers, and librarians. Bringing back lost resources and even giving exposure to resources undiscovered can help improve SOL preparation for students. Not only will resources tailored to their needs motivate students to keep seeking more resources, they will allow students to learn with what works best for them.

2.1 Key Product Features and Capabilities

The primary accessibility of AskMissy will be integration within a school system with access through the use of school IDs. School IDs will allow access to AskMissy both inside and outside of the school system. However, the basics of AskMissy are still accessible without a student ID.

Authentication

Non-registered users are treated as ‘guests’ within the system. Guests have limited access, being able to search for resources, but without the machine learning aspect that comes with created user profiles.

Registered users use the school system to authenticate their profile. Upon registration, a school code will be requested as an input which will transfer the user for authentication to that school. Once users are authenticated, they are given general access to the AskMissy search algorithms. There are three different types of school users: students, teachers, and librarians.

User Capabilities

Students will have access to AskMissy search algorithms and be able to share any resources with other users. This provides the ability where if one student finds a resource that

works especially well for them and wants to share it so others can easily find and access that resource, they can. Students also have the ability to send messages to higher-tier users, being the teachers and librarians and can send resource requests. They are also given limited access to group navigation, being class or course groups, and can view reviews from other students within those groups.

Teachers have access to all student features and are granted full access to class/course group creation and management. Within these groups, teachers will be able to create and manage their lesson plans for student viewing and assistance for resources. With that, teachers are able to deny or accept and forward resource requests from students to the librarian along with their own resource requests. They also have access to viewing students' reviews of resources within the groups.

Librarians have access to all student and teacher features and have access to creating and managing school groups. Librarians are also able to manage and update the school library inventory within the AskMissy system. With that, they can manage the requests for resources and resources the librarian wants to add as well. For any technical support, Librarians may contact administrators.

Administrators have access to all other users' features and primarily work to ensure data integrity. Administrators manage all external database access for their interactions within AskMissy. To allow smooth integration with these databases and AskMissy algorithms, they have access to all user profiles and metadata. Administrators authorize librarians to create school groups, as all new school groups will then become integrated with the rest of AskMissy

metadata. AskMissy administrators may contact school administrators as necessary for data requests.

Feedback/Ratings

AskMissy includes feedback and ratings on all resources in the database. After a resource is recommended, a feedback/rating prompt is given. The feedback and ratings feed into the machine learning algorithm to further have an impact on the user experience. The overall rating of resources will not affect the users personal profile recommendations. The feedback reaction is focused specifically on the user leaving personalized searching intact.

Databases

AskMissy will use internal and external databases. The internal database is the school database comprised of school library and corollary resources. This database is managed by librarians and administrators as resources are added and removed and any other changes that may occur within the "library."

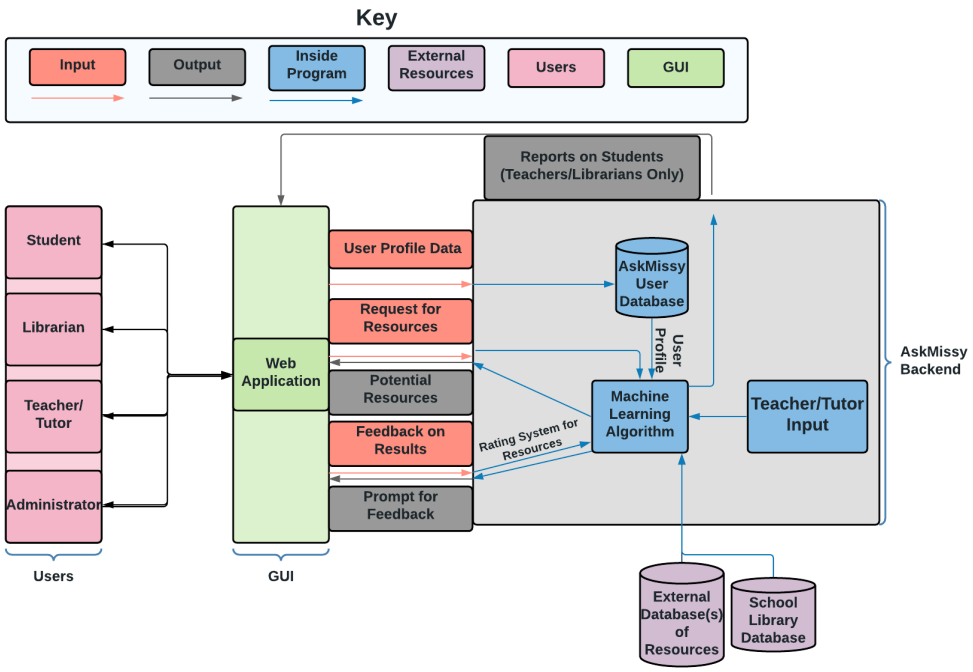
The external database is accessed through web scraping, finding other ways to access appropriate resources. This is managed solely by the administrators as all data will have to then integrate into AskMissy's system passed to the inventory accessed by the librarian.

Machine Learning

Machine learning algorithms are used to find personalized search results. The algorithm feeds off of past recommendation's feedback and rating. It also tracks tags that users commonly select to read. More use of AskMissy means more feeding into the algorithm which means better resource results.

2.2 Major Components (Hardware/Software)

Figure 3:



Hardware

The main piece of hardware required is a device capable of accessing the internet. This allows the device to connect with the numerous servers supporting all of AskMissy's functions. There are five servers; one main frontend server and four backend servers. The backend contains the main backend server, web scraping server, machine learning server, and the main database server.

Software

The major components of the software are the frontend, backend, repository, and the database. The frontend will be made and supported with HTML5, CSS3, and JavaScrip as AskMissy is web-based. The backend will all be made and supported by python as python has

libraries that work very well with machine learning, scraping, and databases. Microsoft Visual Studio Code will be the IDE of voice and automatic navigation will be under PyAutoGUI. The repository utilized is Gitlab and databases will include Amazon RDS, mySQL, and connector/python. Python's scikit-learn library will power machine learning and python in general will be used for natural language processing.

3 Identification of Case Study

Who Is AskMissy For?

AskMissy is for students, teachers, and librarians. The primary focus being to provide students in middle school and high school, or grades 6-12, reliable access to resources they can use for their academic and personal development. AskMissy remains committed to being SOL based and providing the librarians, teachers, and students all the support necessary through its software.

This case study group will use AskMissy to help students search for resources and request to join course/class groups. These groups will allow course recommended resources to be shared. Machine learning will be able to learn a student's personal resource preferences and enable teachers and librarians to find appropriate resources as well.

Those that might benefit from AskMissy in the future will be resource publishers and students' parents. Resource publishers will be able to integrate publishing directly to AskMissy. new resources will be instantly available within AskMissy upon their release.

4 Product Prototype Description

4.1 Prototype Architecture (Hardware/Software)

4.2 Prototype Features and Capabilities

4.3 Prototype Development Challenges

5 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 cross-functional teams

AskMissy: A software 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 type of 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 teacher and students

Personal Learning: An educational approach that aims t**o 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 admin.

Web Scraping: Extracting/scraping data from websites

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