



MySTEMGrowth Profile

Client: University of Iowa, Dr. Ali

Advisor: Dr. Rover

Our Team: Front-End



Jimmy Driskell
Major: Software Engineering



Nathan Frank
Major: Software Engineering



Kaitlin Hansen
Major: Software Engineering

Our Team: Back-End



Lydia McCleary
Major: Software Engineering

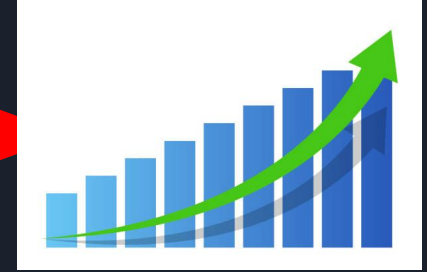
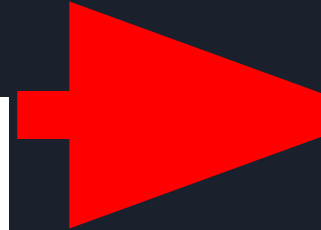
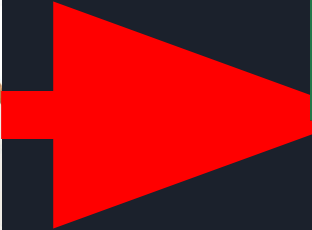


Thomas Nunez
Major: Cybersecurity Engineering

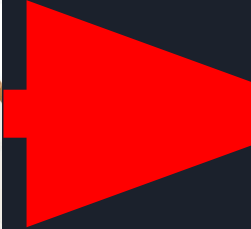


Abe Scheideman
Major: Software Engineering

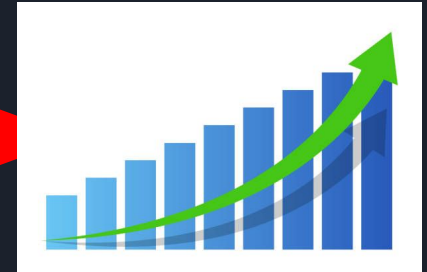
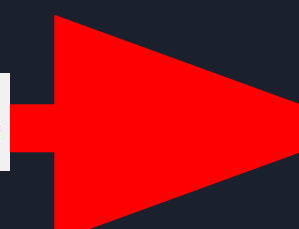
Before



After



MySTEMGrowth Profile



Project Statement

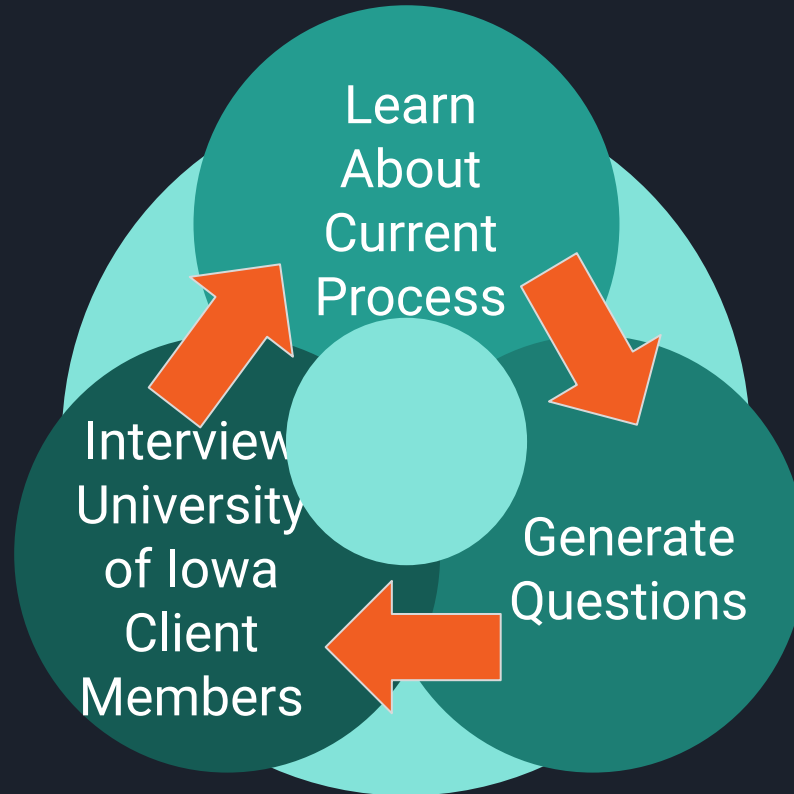
To build a web application where users can take surveys and see their results visualized in a graphical manner.

Use Case:

- Students in the IINSPIRE STEM program take a survey
- Results are collected by mentors
- Graphs are manually created to facilitate discussion
- Currently using Qualtrics and Excel



Requirements Gathering Process





Design Evolution

Backend

- Expanded database design
 - Computation of user responses
 - User privileges based on roles
 - Admin vs participant
- Integrated more AWS services
 - Route 53 - Domain
 - Secrets Manager

Frontend

- Iterated on design throughout the semester based on feedback from University of Iowa
- Accessibility + usability + navigation
- Design for different users
 - Admins vs. participants

Implementation Details

AWS Resources:

- Amplify - frontend React app cloud hosting
- EC2 - backend Node.js app cloud hosting
- Route53 - domain registration
- Certificate Manager - SSL certification
- Secrets Manager - password storage
- RDS - MySQL data storage cloud hosting

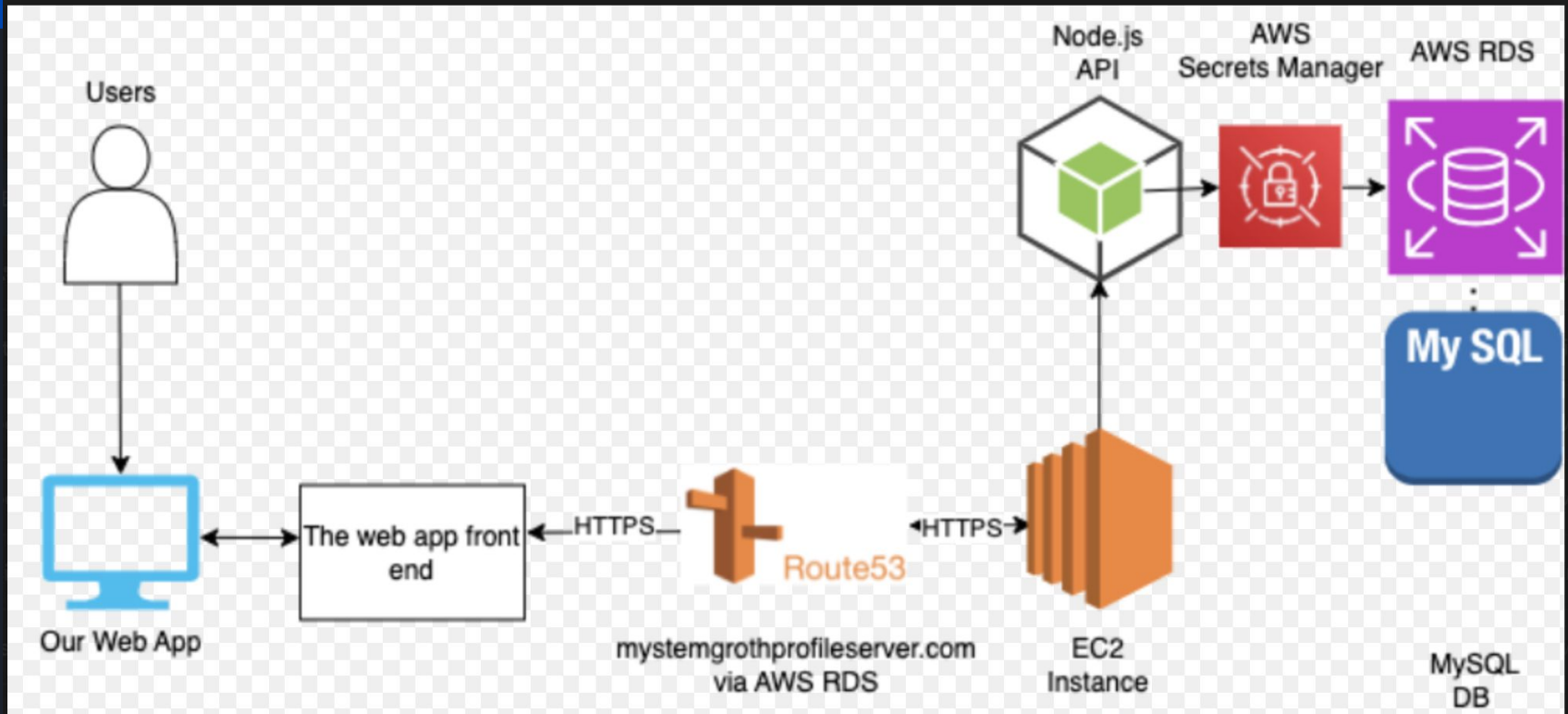


JavaScript Technologies:

- AnyChart - graph generation
- React - frontend framework
- jsPDF - PDF generation
- Axios - HTTPS requests
- JWT - secure data transfer
- Node.js - backend server application
- Express.js - server routing framework
- bcrypt.js - password hashing
- Jest - endpoint and React testing
- SwaggerUI - endpoint documentation



Design Diagram

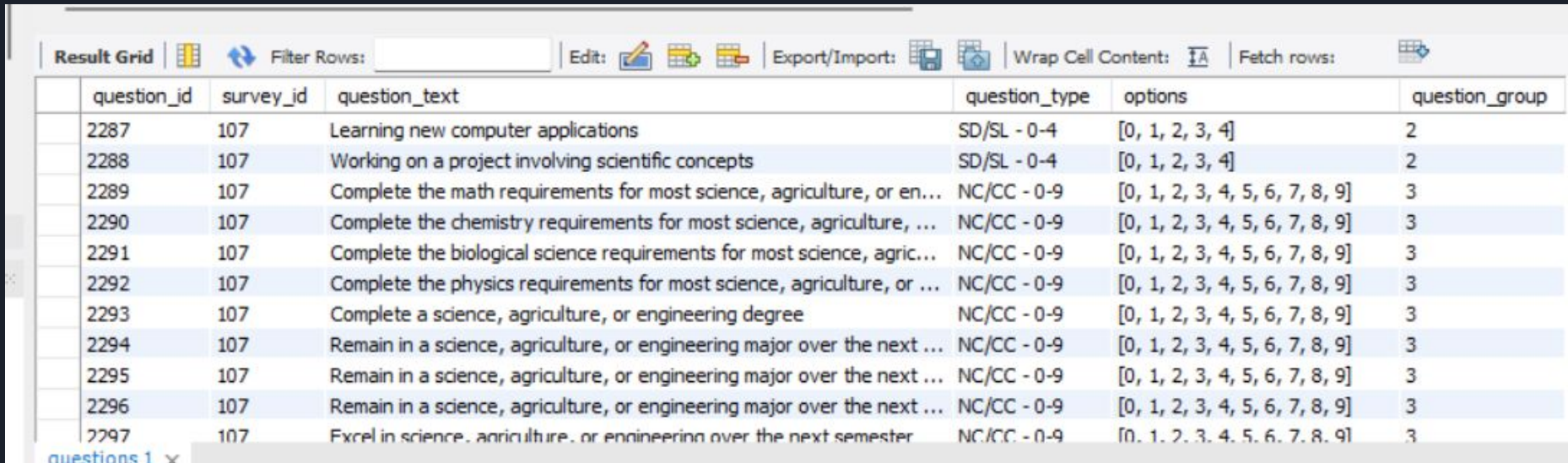


Implementation: Users Table

Result Grid | Filter Rows: | Edit: | Export/Import: | Wrap Cell Content:

	user_ID	password	email	age	gender	ethnicity	credits	stem_interest	institution	role	program
	129	\$2a\$10\$MrRMOXnlbfKVsBryP2...	attempt@gmail.com	23	Man	White	23	test	test	user	ddp6
	130	\$2a\$10\$TzV5gMfOzp87FgG33...	attempt2@gmail.com	23	Man	Hispani...	23	test	test	user	ddp6
	131	\$2a\$10\$XM34pEnp/JSaIWNFG...	demo1@gmail.com	23	Man	White	23	test	test	user	ddp8
	132	\$2a\$10\$D4qBjLr6PSmNLSPY8...	demo2@gmail.com	24	Man	Hispani...	23	test	test	user	IINSPIREDemo
	133	\$2a\$10\$eJ.tbpIHIK/Lkn4hCyTf...	demo3@gmail.com	23	Woman	Hispani...	23	test	test	user	IINSPIREDemo

Implementation: Questions Table



The screenshot shows a software interface with a 'Result Grid' table. The table has the following columns: question_id, survey_id, question_text, question_type, options, and question_group. The data is as follows:

question_id	survey_id	question_text	question_type	options	question_group
2287	107	Learning new computer applications	SD/SL - 0-4	[0, 1, 2, 3, 4]	2
2288	107	Working on a project involving scientific concepts	SD/SL - 0-4	[0, 1, 2, 3, 4]	2
2289	107	Complete the math requirements for most science, agriculture, or en...	NC/CC - 0-9	[0, 1, 2, 3, 4, 5, 6, 7, 8, 9]	3
2290	107	Complete the chemistry requirements for most science, agriculture, ...	NC/CC - 0-9	[0, 1, 2, 3, 4, 5, 6, 7, 8, 9]	3
2291	107	Complete the biological science requirements for most science, agric...	NC/CC - 0-9	[0, 1, 2, 3, 4, 5, 6, 7, 8, 9]	3
2292	107	Complete the physics requirements for most science, agriculture, or ...	NC/CC - 0-9	[0, 1, 2, 3, 4, 5, 6, 7, 8, 9]	3
2293	107	Complete a science, agriculture, or engineering degree	NC/CC - 0-9	[0, 1, 2, 3, 4, 5, 6, 7, 8, 9]	3
2294	107	Remain in a science, agriculture, or engineering major over the next ...	NC/CC - 0-9	[0, 1, 2, 3, 4, 5, 6, 7, 8, 9]	3
2295	107	Remain in a science, agriculture, or engineering major over the next ...	NC/CC - 0-9	[0, 1, 2, 3, 4, 5, 6, 7, 8, 9]	3
2296	107	Remain in a science, agriculture, or engineering major over the next ...	NC/CC - 0-9	[0, 1, 2, 3, 4, 5, 6, 7, 8, 9]	3
2297	107	Excel in science, agriculture, or engineering over the next semester	NC/CC - 0-9	[0, 1, 2, 3, 4, 5, 6, 7, 8, 9]	3

Implementation: Responses Table

Result Grid | Filter Rows: | Edit: | Export/Import: | Wrap Cell Content: |

	response_id	survey_id	user_id	question_id	response_value	submission_date	question_group	attempt_id	program
▶	14623	107	163	2268	5	2024-04-25 18:22:31	0	1	test4422
	14736	107	163	2268	0	2024-04-25 18:23:39	0	2	test4422
	14631	107	163	2269	5	2024-04-25 18:22:31	0	1	test4422
	14738	107	163	2269	1	2024-04-25 18:23:39	0	2	test4422
	14626	107	163	2270	5	2024-04-25 18:22:31	0	1	test4422
	14737	107	163	2270	1	2024-04-25 18:23:39	0	2	test4422
	14633	107	163	2271	5	2024-04-25 18:22:31	0	1	test4422
	14740	107	163	2271	1	2024-04-25 18:23:39	0	2	test4422

responses 1 x

Implementation: Landing Page

MySTEMGrowth Profile

MyStemGrowth Profile

When you're in the thick of your studies, sometimes it can be challenging to appreciate where you are in your STEM journey. MyStemGrowth Profile will allow you to step back and see where you are along your path. Our surveys explore your personal beliefs about your capabilities and how those might help your community. Take the surveys, explore your results, and celebrate your unique path in the world of science, technology, engineering, and mathematics.

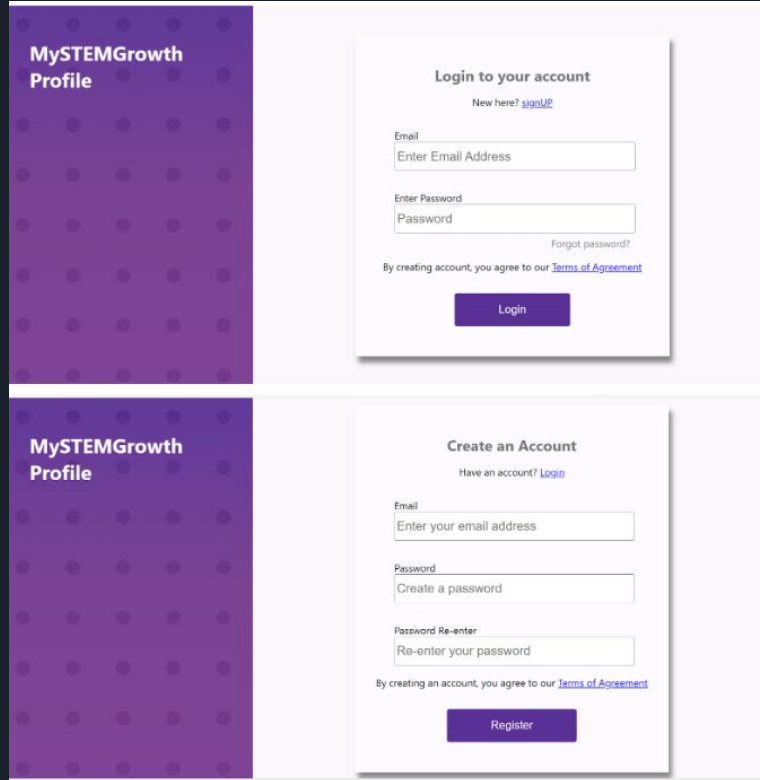
MySTEMGrowth Profile

Login

Sign Up

your capabilities and how those might help your community. Take the surveys, explore your results, and celebrate your unique path in the world of science, technology, engineering, and mathematics.

Implementation: Log In and Sign Up



The image displays two screenshots of the MySTEMGrowth Profile user interface. Both screenshots feature a purple sidebar on the left with the text "MySTEMGrowth Profile" and a pattern of small white dots. The top screenshot shows the "Login to your account" form, which includes a "New here? [signUP](#)" link, an "Email" field with the placeholder "Enter Email Address", a "Password" field with the placeholder "Enter Password", a "Forgot password?" link, a "By creating account, you agree to our [Terms of Agreement](#)" statement, and a purple "Login" button. The bottom screenshot shows the "Create an Account" form, which includes a "Have an account? [Login](#)" link, an "Email" field with the placeholder "Enter your email address", a "Password" field with the placeholder "Create a password", a "Password Re-enter" field with the placeholder "Re-enter your password", a "By creating an account, you agree to our [Terms of Agreement](#)" statement, and a purple "Register" button.

Implementation: Terms of Agreement

MySTEMGrowth Profile

Login

Sign Up

Terms Of Use

Terms of Use for MySTEMGrowth Profile

Introduction

Welcome to MySTEMGrowth Profile. This Terms of Use ("Agreement") governs your use of our survey tool designed to assess and support your growth potential within the fields of Science, Technology, Engineering, and Mathematics (STEM). By accessing or using our survey tool, you agree to be bound by the terms and conditions outlined in this Agreement.

1. Data Compilation and Presentation

1.1 Our tool collects responses to various survey questions related to your interests, abilities, and aspirations in STEM fields. The primary purpose of this data collection is to compile and analyze your responses to provide you with personalized insights and recommendations aimed at fostering your development in STEM.

1.2 The results presented to you will include comparative analytic profiles and potential growth areas.

2. Use of Data for Program Evaluation

Implementation: Admin Home

MySTEMGrowth Profile

Logout

Welcome to MySTEMGrowth Admin Profile!

This tool will help students to understand their beliefs about their STEM abilities. This inventory will capture a snapshot that will generate a profile that students can use to recognize their STEM growth potential.

Access the following pages to view student's results, create new programs, or make changes to the survey questions!

[View Student Results](#)

[Create New Program](#)

[Edit A Survey](#)

[Assign Admin](#)

[Reset a Password](#)

Implementation: Admin Results

MySTEMGrowth Profile

Logout

Admin Results

Enter Student Email:

Retrieve by Email

Select a Program:

Retrieve by Program Name

Please allow a few seconds for the download to start after clicking the button. If the download still does not start, please ensure that you have correctly entered the email or selected a program name.

[Return Home](#)

Implementation: Admin Create New Program

Create New Program Groups

Enter New Program Name:

Create New Program

[Return Home](#)

Implementation: Admin Edit Survey

MySTEMGrowth Profile



Select a Survey to Edit:

Edit Survey Questions

I feel responsible for my community

Save Changes

I believe I should make a difference in my community

Implementation: Admin Update Access

MySTEMGrowth Profile Logout

Assign Admin

Enter Account Email:

[Assign Admin](#)

[Return Home](#)

MySTEMGrowth Profile | [Terms of Use](#)

Implementation: Admin Reset User Password

MySTEMGrowth Profile

Logout

Reset User Password

Enter Account Email:

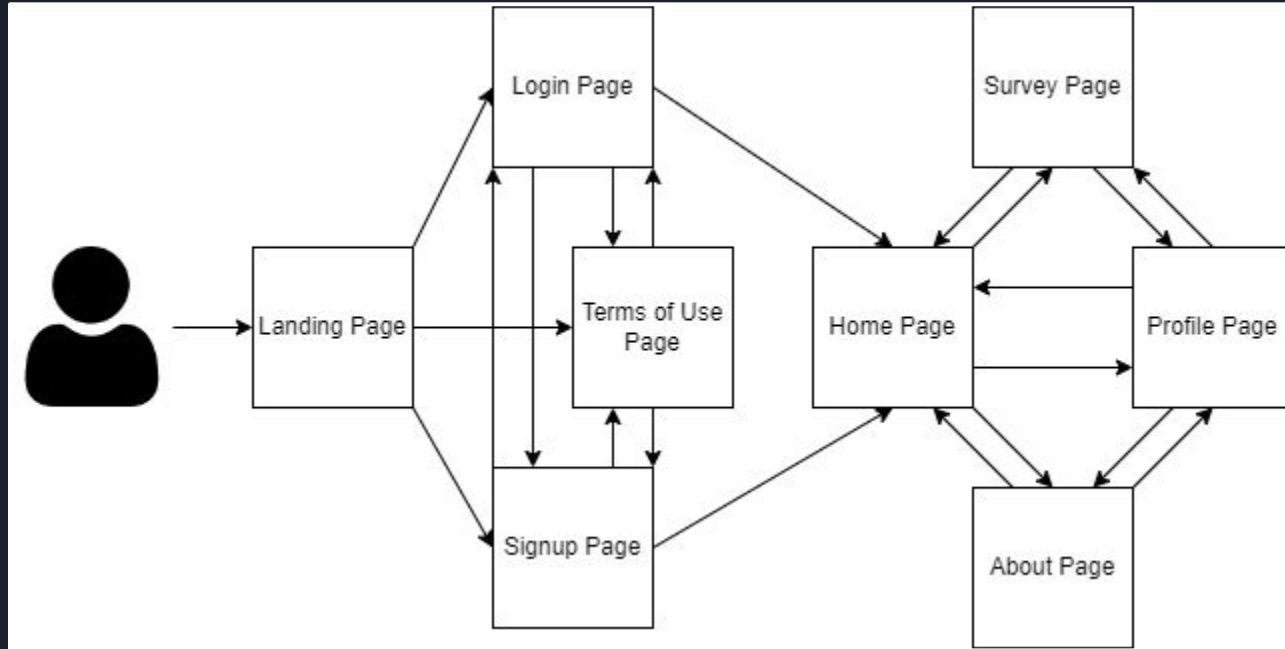
Enter New Password (minimum of 7 characters):

Confirm New Password:

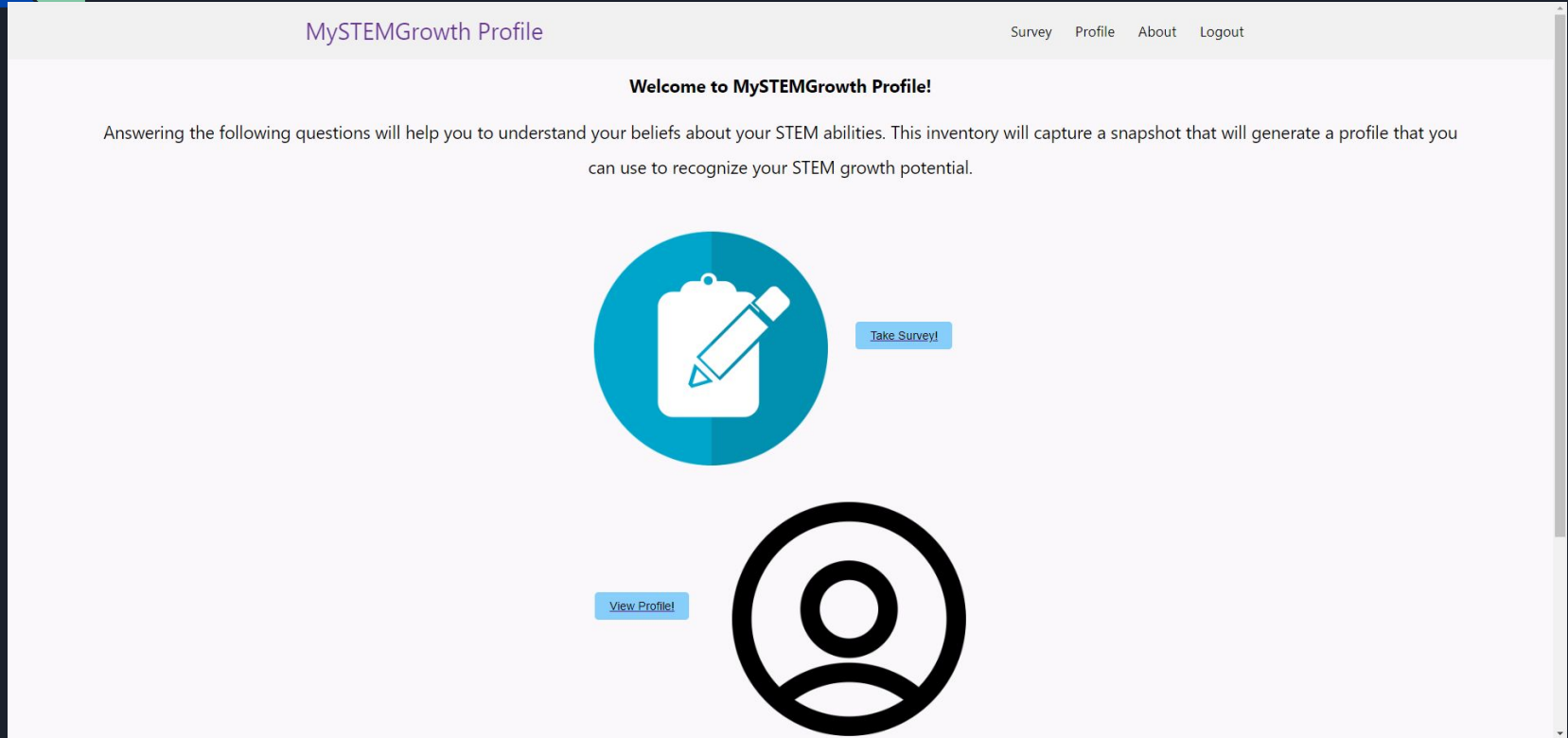
Reset Password

[Return Home](#)

Student User Flow



Implementation: Student Home Page




The screenshot shows a web interface for 'MySTEMGrowth Profile'. At the top left, the title 'MySTEMGrowth Profile' is displayed in purple. At the top right, there are navigation links: 'Survey', 'Profile', 'About', and 'Logout'. The main content area features a welcome message: 'Welcome to MySTEMGrowth Profile!' followed by a paragraph: 'Answering the following questions will help you to understand your beliefs about your STEM abilities. This inventory will capture a snapshot that will generate a profile that you can use to recognize your STEM growth potential.' Below this text are two interactive elements: a blue circular icon with a white clipboard and pencil, accompanied by a 'Take Survey!' button, and a black circular icon with a white person silhouette, accompanied by a 'View Profile!' button.


MySTEMGrowth Profile

Survey Profile About Logout

Welcome to MySTEMGrowth Profile!

Answering the following questions will help you to understand your beliefs about your STEM abilities. This inventory will capture a snapshot that will generate a profile that you can use to recognize your STEM growth potential.

 [Take Survey!](#)

[View Profile!](#) 

Implementation: Survey Page

Survey

General Questions

Which program are you in?

What is your age?

Please indicate your gender (select all that apply)

- Woman
- Man
- Transgender
- Non-binary/Non-conforming
- Prefer not to respond

Please indicate your race/ethnicity (select all that apply)

- African American
- White
- Hispanic/Latino(a)
- Asian
- American Indian/Alaska Native
- Native Hawaiian/Other Pacific Islander
- Prefer not to respond

How many higher education credits have you taken?

What is your STEM area of interest?

Which institution of higher education are you attending (or planning on attending)?

Next

Implementation: Survey Page

MySTEMGrowth Profile



Survey

Please indicate the level to which you agree or disagree with each statement

I feel responsible for my community	Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Agree
I believe I should make a difference in my community	Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Agree
I believe that I have a responsibility to help the poor and hungry	Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Agree
I am committed to serve in my community	Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Agree

Implementation: Survey Page

MySTEMGrowth Profile



Defend results to a critical audience	0	10	20	30	40	50	60	70	80	90	100
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Identify implications for future research	0	10	20	30	40	50	60	70	80	90	100
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Identify and report limitations of study	0	10	20	30	40	50	60	70	80	90	100
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Identify and report limitations of study	0	10	20	30	40	50	60	70	80	90	100
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Synthesize results with regard to current literature	0	10	20	30	40	50	60	70	80	90	100
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Organize manuscript according to appropriate professional format and standards	0	10	20	30	40	50	60	70	80	90	100
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

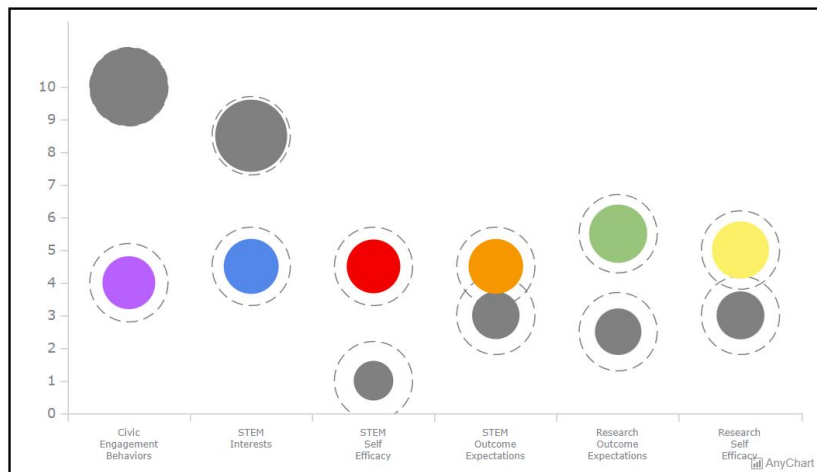
Finish Survey

Implementation: Results Page



Implementation: Results Page

MySTEMGrowth Profile



Download

Data:

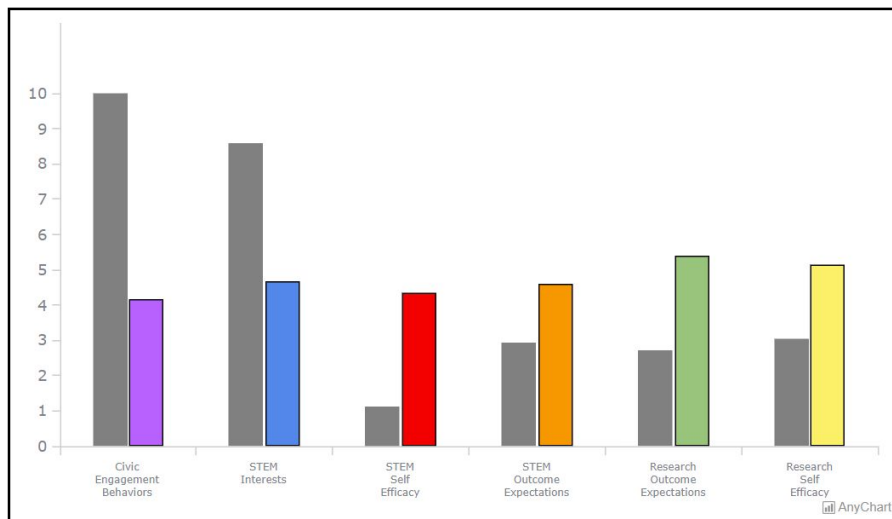
2024-04-25

Compare to:

2024-04-22

View as bar chart

Implementation: Results Page



Download

Data:

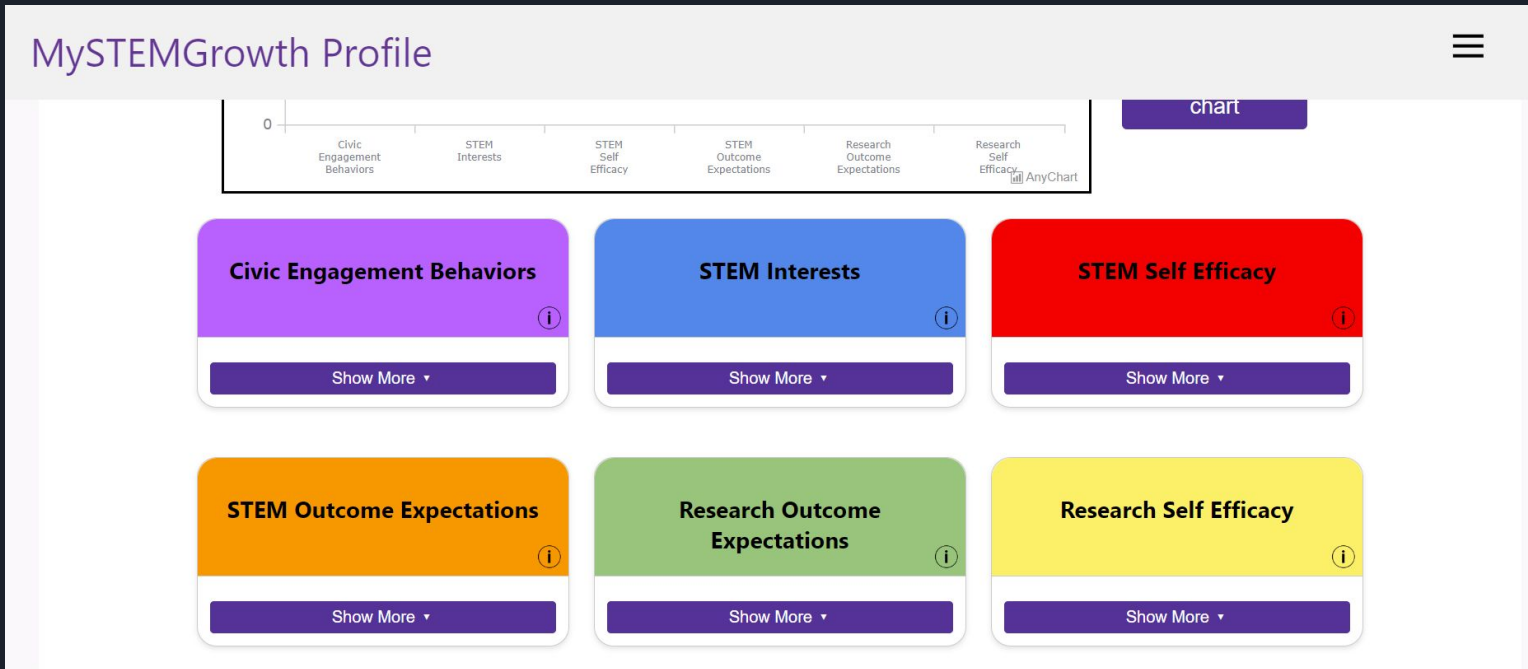
2024-04-25

Compare to:

2024-04-22

View as
bubble chart

Implementation: Results Page



Implementation: Results Page

MySTEMGrowth Profile Survey Profile About Logout

Civic Engagement Behaviors ⓘ
Show More ▾

STEM Interests ⓘ
Your STEM interest circle is smaller, you indicated you dislike different tasks associated with STEM. Don't worry if your circle is smaller, there is plenty of time to grow your interest in college.
Show Less ▾

STEM Self Efficacy ⓘ
Show More ▾

STEM Outcome Expectations ⓘ
Your STEM outcome expectations circle is smaller you might not know yet how these STEM activities may benefit your future career, however, through experience in college your circle will likely grow as you gain more understanding and confidence in STEM.

Research Outcome Expectations ⓘ
Your research outcome expectations circle is smaller you might not know yet how these research related tasks may benefit your STEM major, however, by participating in research experiences such as labs/other activities your circle will likely grow as you gain more.

Research Self Efficacy ⓘ
Show More ▾

Implementation: About Page

About

Civic engagement behaviors:

(1) Doolittle, A., & Faul, A. C. (2013). Civic engagement scale: A validation study. *SAGE Open*, 3(3), 1–7. <https://doi.org/10.1177/2158244013495542>

STEM interest:

(2) Lent, R. W., Brown, S. D., Schmidt, J., Brenner, B., Lyons, H., & Treistman, D. (2003). Relation of contextual supports and barriers to choice behavior in engineering majors: Test of alternative social cognitive models. *Journal of Counseling Psychology*, 50(4), 458–465. <https://doi.org/10.1037/0022-0167.50.4.458>

(3) Byars-Winston, A., Estrada, Y., Howard, C., Davis, D., & Zalapa, J. (2010). Influence of social cognitive and ethnic variables on academic goals of underrepresented students in science and engineering: A multiple-groups analysis. *Journal of Counseling Psychology*, 57(2), 205–218. <https://doi.org/10.1037/a0018608>

STEM self-efficacy:

Frontend Testing

- Unit
- Interface
- Regression
- System

File	% Stmts	% Branch	% Funcs	% Lines
All files	34.5	12.64	19.87	34.73
components	61.11	33.33	37.5	61.11
AdminNavBar.js	0	0	0	0
Card.js	75	50	33.33	75
footer.js	100	100	100	100
landingNavbar.js	75	50	50	75
context	50	100	0	50
AuthProvider.js	50	100	0	50
functions	81.81	50	66.66	82.75
graph.js	81.81	50	66.66	82.75
hooks	100	100	100	100
useAuth.js	100	100	100	100
routes	26.82	7.43	16.42	26.99
about.js	100	100	100	100
adminAssign.js	27.77	0	20	27.77
adminCreate.js	43.75	50	20	43.75
adminHome.js	100	100	100	100
adminPasswordReset.js	24.13	0	14.28	25.92
adminResults.js	21.66	100	7.14	21.66
adminSurvey.js	22.91	0	5.88	23.4
forgotPassword.js	100	100	100	100
home.js	100	100	100	100
landing.js	75	100	50	75
login.js	30	0	14.28	30
navbar.js	75	50	50	75
profile.js	21.33	4.16	20	21.33
requireAuth.js	100	50	100	100
signup.js	25.8	0	11.11	25.8
survey.js	25.51	4.34	9.8	25.64
termsOfUse.js	100	50	100	100

Backend Testing: Postman

Local Request

- > questions
- > responses
- > surveys
- > users
- > exports
- > programs

Main Requests New

- > questions
- > responses
- > surveys
- > users
- > exports
- > programs

POST ▼ | https://mystemgrowthprofileserver.com/api/users/login

Params Authorization Headers (9) **Body** ● Pre-request Script

none form-data x-www-form-urlencoded raw binary

```
1 {
2   ... "email": "425test@gmail.com",
3   ... "password": "passwordHere"
4 }
```

Body Cookies Headers (8) Test Results

Pretty Raw Preview Visualize JSON ▼ ⇒

```
1 {
2   "success": 0,
3   "message": "Email or password incorrect."
4 }
```

POST ▼ | https://mystemgrowthprofileserver.com/api/users/login

Params Authorization Headers (9) **Body** ● Pre-request Script

none form-data x-www-form-urlencoded raw binary

```
1 {
2   ... "email": "425test@gmail.com",
3   ... "password2333": "passwordHere"
4 }
```

Body Cookies Headers (8) Test Results

Pretty Raw Preview Visualize JSON ▼ ⇒

```
1 {
2   "success": 0,
3   "message": "\"password\" is required"
4 }
```



Broader Context/Outcomes

- Tracking and demonstrating student progress to themselves and their instructors
- Aid in introducing underserved students to STEM and retaining them
- Tool supports STEM programs providing resources to further advance students in academia and thus equip them with skills for industry

Potential Future Features

- Increased customization for surveys
 - Editing questions
 - Uploading survey documents
- Results exported by demographic
- Increased Test Coverage
- Stronger security



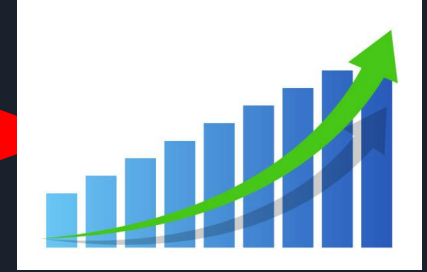
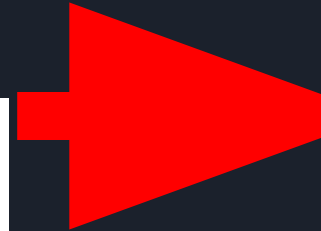
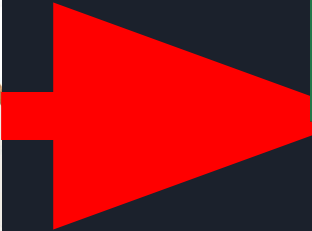


Conclusions

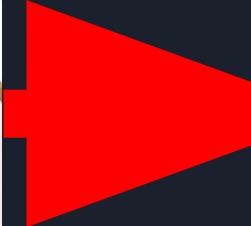


- Contributions:
 - Back-End Development: Lydia McCleary, Thomas Nunez, Abe Scheideman
 - Front-End Development: Jimmy Driskell, Nathan Frank, Kaitlin Hansen
 - Advisor/Client Communication Lead: Jimmy Driskell
 - Grad Student Communication Lead: Kaitlin Hansen
 - University of Iowa Students Communication: Jimmy Driskell
 - Webmaster: Lydia McCleary

Before



After



MySTEMGrowth Profile

