Software Development for Tahook:

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Elicitation

The primary users for Tahook are students, teachers, or tutors. They are typically used in an educational environment to simultaneously to review content and add engagement to the lesson. However, there are limitations to the system. As a result, the following questions were asked to target users:

1. What is your primary use for Tahook?
2. Have you experienced any general issues – or limitations with Tahook currently? If so, what are these limitations?
3. Are there any features from Tahook compeititors/in general that you would think would be valuable to add?
4. How has using Tahook enhanced your teaching/learning activities?
5. Do you believe the current presentation of results in Tahook is informative/beneficial? Would you prefer another method of presentation?

As a result, some of the responses to the following questions brought up their frustrations and complications had with the Tahook functionalities.

"My students often get distracted by competition and fail to engage with the learning experience!" – Sukhesh Patro (uses it in his tutoring lessons)

"I wish there was an ability to turn the Tahook questions into Anki/Quizlet cards to revise the content" – Jayme Chew (student who engages in Tahook quizzes in class)

"Sometimes the text and videos I embed are not visible or do not play – it makes it an awkward experience and causes the question to be negligible" – Tasfia Ahmed (utilises in her part-time tutor job)

"I wish there was an option to generate personalised reports to track my student's progress" - Tiffany Ali (utilises it in her tutoring classes)

To solve the following issues, we have developed a few solutions:

In order to minimise the focus on competition, but rather the learning experience, the introduction of a new type of quiz would be beneficial. This type of quiz would lack a timer option, and instead be controlled by the teacher to ensure all students have answered. This would also assist with the generation of personalised reports, where all students are given an opportunity to answer, giving a more holistic analysis of individual progress when paired with the CSV capabilities.

To address the complications with media that may occur with the frontend we can add a caption option when uploading pictures to quizzes and questions. This allows a substitute sentence to be presented, limiting the disturbance to the running of the quiz.

Analysis and specification

The collated responses are expressed through user stories – allowing a user-focused framework and aligning with the components of an agile program. Examples include the following:

"As a tutor for primary school students, I want reduce the competitiveness between my students in playing Tahook, so that they focus more on learning the content"- Sukhesh Patro

User Acceptance Criteria:

- controlled timing/point system in creation of quizzes/questions
- when answering quizzes reduce the points allocated for speed
- increased quiz time
- higher focus of points that focus on accuracy
- reveal explanation for answer options + time to read/teacher to explain

"As a tutor for high school students, I want to have a back-up method when videos/pictures are not properly embedded/displayed, so that all questions are equally as engaging" – Tasfia Ahmed

User Acceptance Criteria:

- upload a backup file in case the original image doesn't display
- when image/video doesn't load – automatically supplement for backup file
- display in similar style to rest of question
- same interaction of back-up file – like the original media

"As a student, I want to be able to review Tahook content in my own time using my existing flashcard apps, so I am able to sufficiently learn the content at my own pace" – Jayme Chew

User Acceptance Criteria:

- shareable Kahoots to students for learning
- should be able to see same content as Kahoot – all questions and answer
- student mode: include explanations or relevant textbook pages/removes timer feature
- compatibility with external flashcard apps – export questions as csv

These user stories and acceptance criteria are then formulated into use cases, to discern the behaviour of the user interacting with the program, and therefore builds the framework of the feature. We can categorise these use cases based on their properties: learning oriented, media oriented, and reviewal oriented. Thus, developing the following use cases:

learning-oriented	media-oriented	reviewal oriented
1. Teacher creates a "class learning" type of quiz 2. Tahook displays format for teacher to fill – including longer quiz time (>3 minutes), length of "grace period" (for students to read and understand questions), explanations for each question. 3. Teacher fills this form 4. Tahook creates a quiz under the teacher's account 5. Teacher starts Tahook quiz 6. Tahook gives assigned amount of time ("grace period") to read question 7. Students answer questions 8. Tahook scores students only based on accuracy 9. Tahook displays the answer + explanations 10. Teacher reads and explains questions based on responses	1. Teacher creates a quiz 2. Tahook displays quiz form for teacher to fill – including alternate caption that describes the media in words to display (in the case file does not display). 3. Teacher fills form 4. Tahook creates quiz under teacher's account. 5. Teacher starts Tahook quiz 6. Tahook cannot fetch the inputted media/takes prolonged time to display 7. Tahook displays alternate text below original media.	1. Teacher creates a " reviewal oriented " quiz 2. Tahook displays quiz form for teacher to fill – including explanations questions and answers, and links to relevant textbook pages/articles 3. Teacher fills form 4. Tahook creates quiz under account 5. Quiz is played in class 6. Teacher generates shareable link 7. Tahook removes timer feature once link is generated 8. Student uses link at home to access "student mode" 9. Student plays Tahook by themselves 10. Tahook displays correct and incorrect answers 11. Student exports questions as CSV 12. Tahook compiles questions 13. Student imports CSV in flashcard app

Validation

To ensure the developed solutions align with user needs and expectations, they were reviewed by the original responders.

"I like the idea. However, I am worried that reducing the points allocated for speed will cause my class to lose engagement" – Sukhesh Patro

"That sounds good! I think this will help resolve the issue" – Tasfia Ahmed

"The solution fits my requirements, but I'm concerned the process may be a bit complicated for the teacher to create a completely new quiz" – Jayme Chew

Overall, the proposed solutions aligned with their objectives and received positive feedback. However, there are raised concerns which can be addressed through revising the original use cases.

In the case of the learning-oriented solution, extra points can be gained in the participation of quizzes leading to a reward system involving bronze, silver and gold badges. This can be redeemed for a small multiplier in a question, incentivising participation.

The worries of the student-reviewal solution can be addressed by implementing an import from existing quiz feature within Tahook, which automatically fills details of the quiz and an creates explanation option for the teacher to fill in.

After considering the above two features, the use cases of these solutions have been revised:

learning oriented	reviewal oriented
1. Teacher creates a "class learning" type of quiz 2. Tahook displays format for teacher to fill – including longer quiz time (>3 minutes), length of "grace period" (for students to read and understand questions), explanations for each question. 3. Tahook creates a quiz under the teacher's account 4. Teacher starts Tahook quiz 5. Tahook gives assigned amount of time ("grace period") to read question 6. Students answer questions 7. Tahook adds participation point to the user with each answer submission 8. Student redeem multiplier with participation points to increase question score 9. Tahook applies multiplier to question score 10. Tahook scores students only based on accuracy 11. Tahook displays the answer + explanations 12. Teacher reads and explains questions based on responses	1. Teacher imports existing quiz as "student mode" 2. Tahook displays quiz form for teacher to fill – including explanations questions and answers, and links to relevant textbook pages/articles 3. Teacher fills form 4. Tahook creates quiz under account 5. Quiz is played in class 6. Teacher generates shareable link 7. Tahook removes timer feature once link is generated 8. Student uses link at home to access "student mode" 9. Student plays Tahook by themselves 10. Tahook displays correct and incorrect answers 11. Student exports questions as CSV 12. Tahook compiles questions 13. Student imports CSV in flashcard app

These additions to their respective solutions were then brought to the original responders again to ensure they were adequately satisfied with these features.

"I think that would solve the engagement issue." – Sukhesh Patro

"That should make it easier for teachers" – Jayme Chew

As responders were sufficiently satisfied with the refined solution, the implementation of these features can proceed. A holistic implementation of the learning-oriented approach and the student-reviewal approach would include the addition of two new modes, whilst the media approach can be built upon the existing quiz/question creation and updating of thumbnails or introduced as a new route.

Interface Design

The following three interfaces have been added to the *swagger.yaml* file and are as follows:

POST	/v1/admin/quiz/{quizid}/modes	Copy a new quiz based on the mode supplied
	Given basic details regarding the mode and quiz, create a copy of the existing quiz for the user. By changing the mode, the timer should be removed	
	Parameters	
	Name	Description
	token (header)	e.g. "ifweiufghwiufhgiwu234"
	body (object – body)	`{ "quizId": 5546, "mode": "LEARNING_MODE" }`
	Responses	
	Code	Description
	200	OK `{ "quizId": 5546 }`
	400	If any of the following are true: - quizId does not exist - mode inputted is not an available mode in Tahook `{ "error": "error" }`
	401	Token is empty or invalid (does not refer to valid logged in user session) `{ "error": "error" }`
	403	Valid token is provided, but user is not an owner of this quiz `{ "error": "error" }`

Quiz Mode Route – introduces LEARNING_MODE and REVIEWAL_MODE

GET	/v1/admin/quiz/{quizid}/modes/questions/csv	
	Export all quiz questions in a CSV format	
	Given a quizId and a token, generate quiz questions in a CSV format for exporting.	
	Parameters	
	Name	Description
	token (header)	e.g. "ifweiufghwiufhgiwu234"
	quizid (path)	e.g. 5546
	Responses	
	Code	Description
	200	OK `{ "url": "http://google.com/some/image/path.csv" }`
	400	If quiz is not in the appropriate exporting mode – REVIEW_MODE `{ "error": "error" }`
	401	Valid token is provided, but user is not an owner of this quiz `{ "error": "error" }`

Exporting Quiz Route – introduces exporting quiz questions as CSV for flashcards

PUT	/v1/admin/quiz/{quizid}/modes/{questionid}	
	Using previously created quiz mode, add explanations to questions	
	Given quizId add explanations and edit duration of the questions	
	Parameters	
	Name	Description
	token (header)	e.g. “ifweiufghwiufhgiwu234”
	quizid (path)	e.g. 5546
		e.g. 4478

	body (object – body)	{
		"questionBody": {
		"question": "Who is the Monarch of England?",
		"points": 5,
		"participationPoints": 3,
		"durationBeforeAnswer": 5,
		"answers": [
		{
		"answer": "Prince Charles",
		"correct": true,
		"explanation": "Prince Charles was crowned in May 2023 after Queen Elizabeth passed"
		}
		],
		"thumbnailUrl": "http://google.com/some/image/path.jpg",
		"alternateCaption": "picture of a dog playing with a ball"
		}
		}

	Responses	
	Code	Description
	200	OK {}

	400	If any of the following are true:
		- If quiz is not in the correct mode for questionInputs
		- Question Id does not refer to a valid question within this quiz
		- Question string is less than 5 characters in length or greater than 50 characters in length
		- The question has more than 6 answers or less than 2 answers
		- The points awarded for the question are less than 1 or greater than 10
		- The length of any answer is shorter than 1 character long, or longer than 30 characters long
		- Any answer strings are duplicates of one another (within the same question)
		- There are no correct answers
		- The explanation of any answer is an empty string
		- The explanation of any answer is less than 10 characters or greater than 100 characters
		- The duration before answering is more than 1 minute
		- The thumbnailUrl is an empty string
		- The thumbnailUrl does not end with one of the following filetypes (case insensitive): jpg, jpeg, png
		- The thumbnailUrl does not begin with 'http://' or 'https://'
		- The alternateCaption is an empty string
		- The alternate caption is less than 5 characters or greater than 50 characters in length
		{
		"error": "error"
		}

	401	Token is empty or invalid (does not refer to valid logged in user session)
		{
		"error": "error"
		}

	403	Valid token is provided, but user is not an owner of this quiz
		{
		"error": "error"
		}

Edit Mode Questions Route – introduces durationBeforeAnswer, alternateCaption and answerExplanations

GET	/v2/player/{playerid}/question/{questionposition}/answer	
	Player submission of answer(s) in learning-mode	
	Allow the current player to submit answer(s) to the currently active question. Question position starts at 1 Note: An answer can be re-submitted once first selection is made, as long as game is in the right state Note: In submitting answer, participation points are earnt which can be redeemed in quiz questions for a multiplier	
	Parameters	
	Name	Description

	body	{
		"answerIds": [
		2384
		],
		"multiplier": 0
		}

	playerid (path)	e.g. 252
	questionpositon (path)	e.g. 2
	Responses	
	Code	Description
	200	OK {}

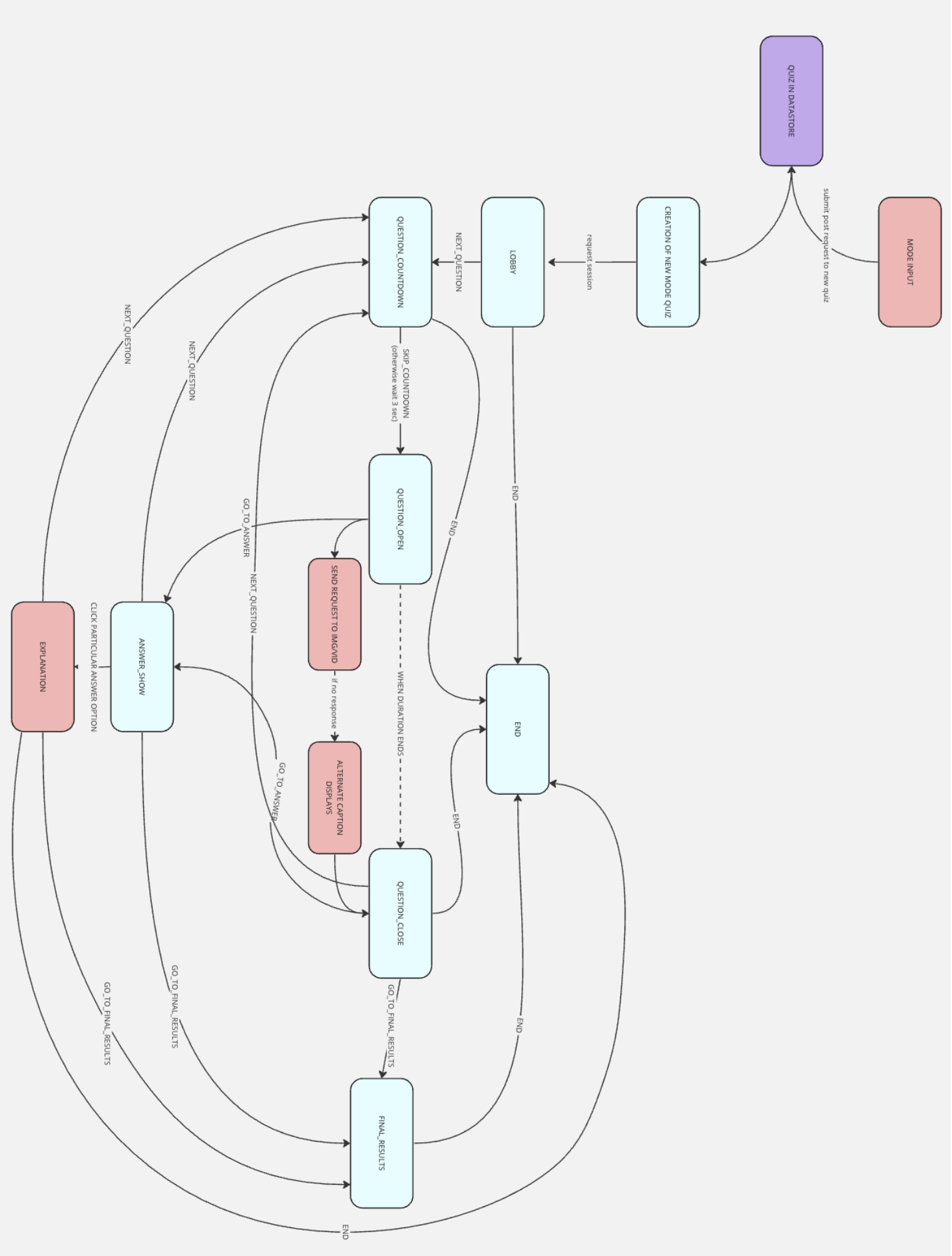
	400	If any of the following are true:
		- If submitting multiplier to a mode other than LEARNING_MODE
		- If playerID does not exist
		- If question position is not valid for the session this player is in
		- Session is not in QUESTION_OPEN state
		- If session is not yet up to this question
		- Answer IDs are not valid for this particular question
		- There are duplicate answer IDs provided
		- Less than 1 answer ID was submitted {
		"error": "error"
		}

V2 of Submission of Answers – introducing participation point multipliers

The following interfaces detail two solutions, one involving the reviewal feature (/v1/admin/quiz/{quizid}/modes/questions/csv) and the other three interfaces focusing on learning instead.

Conceptual Modelling – State Diagrams

The following state diagram (if there are clarity issues please click the embedded link) describes how the Learning Mode will work throughout the whole quiz.



Similarly, the following state diagram looks closer into the Learning Mode's multiplier feature in between questions (if there are clarity issues please click on the embedded link).