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PROG7312_VCDW1 • Task 1

Karl Dicks

Submission UUID: c3daed00-9062-2f3e-9f4f-7a8035461bc2

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Attachment 1	6 %			Word Count: 1,562 PROG3B Task 1 - Karl Dicks - 17667327.pdf
Global database (4)				4%
2 Student paper 4 Student paper	(1	Student paper	Student paper	
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accimally (vvastiliageon state offiversity, mail Each book is issued a "Call Number", which determines it's subject or topic, and other identifying information (eg author and subcategory). The books are arranged into ten broad classifications, shown below: 000 Computer science, information and general work 100 Philosophy and psychology 200 Religion 300 Social Sciences 400 Language 500 Science 600 Technology 700 Art and recreation 800 Literature 900 History and geography (Sixthformstudyskills, n.d.) In order for the application to be engaging, and mentally stimulating, the application should implement a number of learning techniques, which is often referred to as "Gamification". Gamification is the process of making an application or process into a game, which often enhances learning. The application therefore uses game elements and game design techniques in non-game contexts. (Quicksprout, 2016) ① Gamification is the concept of applying game mechanics and design techniques to motivate and engage people to achieve their goals (in this case understanding the Dewey Decimal system). (2) Gamification taps into the basic desires and needs of the user's impulses, which revolve around the status of achievements. (Quicksprout, 2016) In order to make my application engaging, and encourage the efficient and effective use of the Dewey Decimal system, I will describe a number of gamification techniques, and then detail which ones will be best suited for use in my own project. (Quicksprout, 2016) Gamification Feature List There are a number of ways in which you can implement gamification in an application, including the below features: · Leaderboards / Recognition A leaderboard system would provide a competitive aspect to the training application, where "game" completion times will be logged and displayed on the main menu, so that all users of the application may view the top ten high scores, and their usernames. A natural desire that most people have is the urge to compete with one another, and by timing game sessions, this potential for competition can be implemented. (Quicksprout, 2016) One of the simpler gamification techniques would be to show the user how their game times have improved over time. For Task 1 of our project, we are to develop a system where a user can correctly order call numbers, and the time it takes to order a list of call numbers determines how efficient the librarian or student is at "replacing" or correctly ordering books on the shelves.

By showing a list of personal best times, ordered by time ascending, the person can get an understanding of their own progress. (Quicksprout, 2016)

Challenges

The application will implement different levels of difficulty, so the user has different

This provides different challenges depending on the difficulty setting selected by the

user - set on the home screen.

time limits to complete the tests or "games" within.

For example, the user may choose to compete on the "Hard" difficulty setting, which only provides thirty seconds to correctly order the ten call numbers, or "Medium" which allows for forty seconds.

If the user does not complete the game within the stipulated time, they will have to restart the game. (Quicksprout, 2016)

Rewards

A reward system could be implemented, where certain virtual "medals" or

"trophies" are given to the top three scores in the leaderboard. This will implement a $\ensuremath{\mathbf{L}}$

podium-like reward system, where only the top three scores will receive these

rewards or trophies.

This further encourages the librarians or students to compete on the application.

(Laja, n.d.)

4

Feedback

Continual feedback will be provided to the user, in the form of a timer, which will be displayed during the game. It will show the time remaining, depending on which difficulty setting was selected by the user. (Laja, n.d.)

5

 $Gamification\ Features\ for\ Dewey\ Training\ I\ would\ recommend\ that\ the\ Dewey\ Training\ software\ implement\ the\ following\ gamification\ that\ the\ Dewey\ Training\ software\ implement\ the\ following\ gamification\ that\ the\ Dewey\ Training\ software\ that\ the\ following\ gamification\ that\ the\ Dewey\ Training\ software\ that\ the\ following\ gamification\ that\ the\ Dewey\ that\ the\ that\ that\ that\ the\ that\ that\$

features:

• Leaderboards / Recognition

A leaderboard system would provide a competitive aspect to the training application, where "game" completion times will be logged and displayed on the main menu, so that all users of the application may view the top ten high scores, and their usernames.

A natural desire that most people have is the urge to compete with one another, and $% \left(1\right) =\left(1\right) \left(1$

by timing game sessions, this potential for competition can be implemented.

(Quicksprout, 2016)

Once deployed, the system will use an online hosted database, such as Azure SQL

 $\label{eq:decomposition} \textbf{Database, so that all users in the library can compete with one another, and not just}$

on a single computer.

I would recommend this gamification feature, as it would provide a way for both

librarians and students to compete with one another, while also actively learning the $\,$

system in the process.

This feature would provide a great way of competition and therefore active learning

3 of the Dewey Decimal system.

In addition to this, the aim of the feature is to shorten the duration of time required to order the books, and therefore if librarians can correctly order them faster, then they will complete their job faster.

Progress

One of the simpler gamification techniques would be to show the user how their game times have improved over time. For Task 1 of our project, we are to develop a system where a user can correctly order call numbers, and the time it takes to order a list of call numbers determines how efficient the librarian or student is at "replacing" or correctly ordering books on the shelves.

By showing a list of personal best times, ordered by time ascending, the person can get an understanding of their own progress. (Quicksprout, 2016)

This feature will be developed and implemented so that the students or librarians learning the Dewey Decimal system can see their progress over time, and see how efficient their ordering skills have become, after using the system for a while.

6

Challenges

The application will implement different levels of difficulty, so the user has different time limits to complete the tests or "games" within.

This provides different challenges depending on the difficulty setting selected by the user – set on the home screen.

For example, the user may choose to compete on the "Hard" difficulty setting, which only provides thirty seconds to correctly order the ten call numbers, or "Medium" which allows for forty seconds.

If the user does not complete the game within the stipulated time, they will have to restart the game. (Quicksprout, 2016)

This provides a competitive aspect to the training software, as the user can set their desired difficulty, and attempt to beat it, eventually being able to win the games at "Hard" difficulty.

• Rewards

A reward system could be implemented, where certain virtual "medals" or "trophies" are given to the top three scores in the leaderboard. This will implement a podium-like reward system, where only the top three scores will receive these rewards or trophies.

This further encourages the librarians or students to compete on the application.

(Laja, n.d.)

Simple virtual "trophies" will be provided to the top three students or librarians who order the books faster than other users. For example, the application will show the top score in gold, the second in silver, and third in bronze.

• Feedback

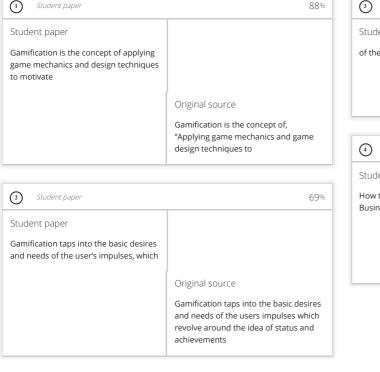
Continual feedback will be provided to the user, in the form of a timer, which will be displayed during the game. It will show the time remaining, depending on which difficulty setting was selected by the user. (Laja, n.d.)

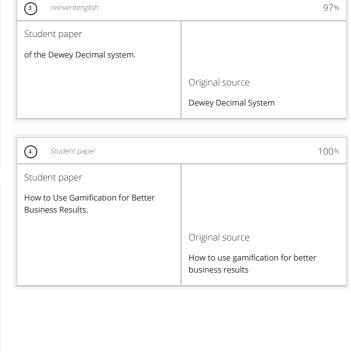
Conclusion In conclusion, these five gamification features will be implemented in the application, so that the training becomes more game-like in that the users become competitive, and the learning experience is more enjoyable and interactive. This will likely result in a higher level of use, and therefore students and librarians will learn from the training software more efficiently and effectively. As mentioned in the introduction, the application is a training system for the Dewey Decimal ordering system, which needs to be efficient and effective at teaching librarians and students how to use the Dewey Decimal system, and with the above gamification techniques implemented, the learning process will become more enjoyable, and produce better results than if these techniques were not implemented. References Laja, P. (n.d.). 4 How to Use Gamification for Better Business Results. Retrieved from Neilpatel: 5 https://neilpatel.com/blog/gamification-for-better-results/ Quicksprout. (2016, 07 15). 6 How to Easily Add Gamification Techniques to Your Content. Retrieved from Quicksprout: (6) https://www.quicksprout.com/how-to-easily-add-gamificationtechniques-to-your-content/ Sixthformstudyskills. (n.d.). (3) Introduction to the Dewey Decimal system. Retrieved from Sixthformstudyskills: https://sixthformstudyskills.ncl.ac.uk/libraries/overview-the-deweydecimal-system/ Washington State University. (n.d.). How to Read Call Numbers. Retrieved from libguides.libraries.wsu.edu: https://libguides.libraries.wsu.edu/callnumbers/dewey

88%

Source Matches (8)

Student paper





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5 Student paper	100%	Student paper	70%
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How to Easily Add Gamification		Student paper	
Techniques to Your Content.		Introduction to the Dewey Decimal	
	Original source	system.	
	How to Easily Add Gamification Techniques to Your Content		Original source
			Dewey Decimal System
 Attachment 2 Institutional database (4) My paper Student paper 	② My paper	My paper	PROG3B Task 1 Documentation - Karl Dicks - 17667327,pdf 21 %
Global database (2) 7 Student paper	6 Student paper		1 %
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Excluded sources (0)			
PROG 3B TASK 1 Documentation Application: Dewey Training App			
		e: BCAD3 Subject: PROG7312 Lecturer: 1 Nira	asha Ramckurran Assignment:
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Database Entities	25
2 Use Case Diagram	26
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2	
1) Introduction As part of our PROG7312 (3B) module, we were	tasked with developing a Dewey Decimal
training application. 1 chose to develop the application in C#,	using the Visual Studio 2019
IDE, as we were familiar with this IDE from other programming mo	odules. My application has
been built in Windows Presentation Foundation (WPF) in .Net Core	e 3.1. There were a
number of requirements that the application had to perform, which	ch have been
implemented in my Task 1, and this will be expanded on for Task 2	2 and the POE projects, in
accordance with our set question paper. ① (The Independent Ir	nstitute of Education, 2020)
The training application allows users to perform multiple actions, i	including:
Register and login	
1 The training application allows the user to register an account	nt with their own
preferences, and log in. (3) User profiles are stored in a local MS	SSQL MDF file, along
with their scores used by the application. (3) This database can e	easily be migrated to an
online Azure database, so that high scores are accessible by every	one in the library
or elsewhere.	
• Replace Books	
The application will allow users to order randomly generated Dew	vey Decimal Call
Numbers (10) – including the decimals and authors into the correct	ct order.
Once the user correctly orders the call numbers, by dragging the b	pooks to their
correct order, the user will be automatically navigated to a confirm	nation page.
Gamification Techniques	
A number of gamification techniques have been implemented, inc	cluding all those
described in the research document.	
These include:	
o Leaderboards	
The user will be able to see the top ten scores (game completion ti	imes), as
these are saved for signed-in users and stored in the database file	e. These
scores are then retrieved and displayed on the home screen when	n the user
first loads the application. (Quicksprout, 2016)	
o Challenges	
The application has implemented a timer, and difficulty levels. For	example,
the user can set the difficulty to "Easy" which allows the user 60 se	econds to
complete the ordering process. They can set it to "Medium" for 40	seconds,
and "Hard" for 30 seconds. This provides different levels of difficul	lty for the
user to complete the ordering in set timeframes. (Quicksprout, 20	116)
o Feedback	
The application displays a timer, and once the timer reaches 10 se	econds, it
will start to alternate between red and white text color, to indicate	e that the
time is almost finished for the user to complete the ordering. (Laja	a, n.d.)

o Rewards

The application shows the top ten scores on the home screen, and these scores are for logged in users only, as the score is linked to their user account. Anonymous users can still use the application without logging in, and will receive their time, however it will not be logged and displayed on the home screen.

The top three scores will have different colours, much like a podium system, where the top scorer gets their row in gold, second in silver, and third in bronze. (Laja, n.d.)

o Progress

In addition to the above gamification techniques, the user will be able to view all their personal scores on a grid view, and this will be displayed by highest score first (lowest time taken to complete the ordering). This allows the user to track their progress over time, if they are logged in. (Quicksprout, 2016)

Restart Training

Finally, the user will be able to restart their game by pressing the "Restart" button on the "Replace Books" page. This will reset the timer, replace the books with new auto-generated call numbers and authors, and allow them to start the game again.

(The Independent Institute of Education, 2020)

4

① Help File The training application provides numerous functions, which will be described in depth in the following section. ① The help file has been broken up into multiple sections, describing each page of the desktop application.

Home Page

The application will first load to the home page, as an "Anonymous User".

An anonymous

user can view all high scores, set difficulty of the game, login, register, and access the

"Replace Books" function required for Task 1.

- The high scores will be displayed in a data grid on the right-hand side of the home screen, with scores (time taken to complete the ordering of the books), usernames, and the date and time that the user took the test.
- The user can access the "Replace Books" function, however they will not be able to save their high scores or access their score log without signing in. Therefore, their high score will not be displayed on the home screen.
- In addition to this, the top three scores are displayed with different background colours, in order to create a podium-like system. For example, the highest score will be displayed with a gold background, second highest will be displayed with a silver

background, and the third will be displayed with a bronze background. \\

- The user may use button click events to complete the following actions:
- o Navigate to the login / registration page,
- o Navigate to the replace books page,

o Navigate to the identify areas page,
o Navigate to the view all scores page,
o Exit the training application,
o Minimize the window.
• Once the user has logged in, and is no longer an anonymous user, they may select a
"View All Scores" button on the home screen, which will display their score log on a
data grid.
• The user may select the different score views by selecting the "Set Score View"
combo box and choosing a test type.
• The user may also set the game difficulty by selecting the combo box at the bottom
of the main page, and from there they can select either "Easy", "Medium", or
"Hard", which will set the time limit for the various games.
The login functionality will be described next.
5
Login Page
① Once the user selects the "Login" button on the home screen, they will be brought to a page
where they can log into an existing account, or register a new account on the system.
The login page provides a number of buttons, and input, including:
Username input,
• Password input,
1 • Register button – brings the user to a registration page,
• Login button – logs the user in,
Back button (left arrow at the top left of the screen).
1) The user can enter their unique credentials, and log into their account. The logged in
username at the top left of the screen will be changed to "User: <username>", eg "User:</username>
Karl".
1) Once the user has logged in successfully, they will be brought back to the home page, where
they can navigate to all functionality of the application.
The login page validates user accounts, and therefore if the user credentials are incorrect,
they will not be logged in, and a generic "Username / Password Incorrect" message will be
displayed.
This is a generic message, as to not encourage username harvesting, whereby users attempt
to determine valid usernames, if only the password is incorrect – eg the message does not
display "Password Incorrect", when a username is in fact valid, however a password is
incorrect.
Register Page
The user can navigate to the register page, once they press the "Register" button on the
login page. (3) This page allows new users to sign up an account with the system.
A number of buttons and input boxes are displayed on the register page, including:
Username input,
• Password input,
Confirm password input,
① • Register Account button,
Back button (left arrow at the top left of the screen).

The user can enter unique credentials on this page, and create a new account with the system. If the user enters a username already in use, an error message will be displayed, and password validation ensures both the confirm password and password input boxes contain the same password values.

Once the user enters valid credentials, they can press the "Register Account" button, which

(1) will create the account in the database, and navigate the user back to the login page, where they can login with their new details.

6

Replace Books

This page provides functionality required for our Task 1 submission, where the user can:

View auto-generated Dewey Decimal Call Numbers, which are shown on a data grid
on the right of the page. These Dewey Decimal's show the decimal as well as the
author.

Both of these values (decimal, and author) are automatically generated using a custom random generator.

- Re-order the books into their correct order, as the application randomly places books on the "shelf", for example, the Dewey Decimal system requires that all books are ordered by numerical order as well as alphabetically eg "035.8605 NVG" comes before "035.8605 ZAK" or "035.8605 NVG" comes before "125.8605 ABC".

 The user can simply drag and drop rows (books) into the correct order on the "shelf", once they press the "Start" button.
- Start the game by pressing the "Start" button on the bottom left of the page. Once started, the timer will start to tick down to show the time remaining. The difficulty setting will determine how long the user has to correctly order the books.

 In addition to this, the Call Numbers will be generated again, so users cannot

determine where the books should be before starting the game, and have the timer tick down.

• The user may return to the main page by pressing the "Return" button. This will cancel the current training session or "game". This score will not be logged, and the user will have to restart the game to start again.

Once the user re-orders all books, they will be navigated to a confirmation page, where they can view time taken to order the books (score in seconds). If they are logged in, this score will be saved in the database, along with the logged in user and time taken of the test.

Confirmation Page

Once the books have been ordered, or the time has run out, the user will be navigated to a confirmation page, which will either display "The books have been successfully ordered" or "The books have not been successfully ordered".

When the user orders the books in the correct order within the specified timeframe (eg 30 seconds), the time taken to complete the ordering of the books will be displayed.

In addition to showing this information, the following actions can be completed on this

page:

• Finish – navigates the user back to the home page.
• View Order – navigates the user to a page where the correct order of the books is
displayed, according to the Dewey Decimal System – in numerical and alphabetical
order.
7
Readme Project Title: Dewey Training
Welcome to Dewey Training. This new desktop application has been developed for libraria
and other users to learn the Dewey Decimal ordering system. The aim of this application is
to get librarians and other users of the system to order and manage books efficiently at
libraries. This would improve efficiency, and accuracy of these users, when they replace
books on the numerous shelves in a library.
This application encourages users to improve their book replacement efficiency, and by
4 extension the learning of the Dewey Decimal system. By implementing gamification
techniques, such as leaderboards, challenges, feedback, rewards, and progress, the user i
encouraged to compete with one another, and learn in the process. By tracking and
displaying this information, the user is more likely to see the training software as a game,
and therefore compete with one another.
In addition to this, the database will eventually be deployed to an online hosting platform
(eg Azure SQL database), so that users on different devices may be able to compete with
one another – they will be able to see one single leaderboard across multiple devices.
Getting Started
1 The following steps are required to get the Dewey Training software running on the
development environment:
① • Open the application source code in Visual Studio
• Set the start-up project to "Dewey Training"
• Run the application on any Windows PC
• Ensure the system is using the dot "." Delimiter for decimals (EN-US)
Prerequisites
2 There are a few prerequisites required to run the application, including:
1 • Install the *latest Visual Studio
• Install prerequisites to run .Net Core 3.1 WPF desktop applications
1) *latest Visual Studio as of when the application was developed is: Visual Studio 2019
More detailed specifications are included below
Microsoft Visual Studio Enterprise 2019
Version 16.7.2
VisualStudio.16.Release/16.7.2+30413.136
Microsoft .NET Framework
Version 4.8.04084
8
Installing
Open the application source code in Visual Studio

 $https://myvc.iielearn.ac.za/webapps/mdb-sa-BBLEARN/originalityReport/ultra? attemptId=1c0b239b-370e-48df-bdca-b8f1f6810b0f\&course_id=... \\ 11/25$

• Set the start-up pr	roject to "Dewey Training"
• Run the application	on on any Windows PC
1 The developm	nent test system has been detailed on the following page.
9	
Test System	
Development PC	
10	
Built With	
2 Visual Studio -	The IDE used to develop the desktop application
.NET Core 3.1 – Fra	mework
WPF – Windows Pre	esentation Foundation – Used to design the application in C# and XAML
Models – Used to st	tructure data within the application.
Data Access Layer (DAL) – Assembly used to access the database.
Versioning	
Version 16	
2 Authors Karl E	Dicks - 17667327
Acknowledgments	Inspiration: Programming 3B POE Question Paper
Demo Video link:	https://youtu.be/BvGGQlEeJBQ
https://youtu.be/Bv	vGGQIEeJBQ
11	
2 Screenshots T	he user interface for Dewey Training desktop application has been designed, and all functionality has been implemented. Below is the
2 interface for n	ny application:
Home Page	
Once the user load:	s the application for
the first time, they	will be presented
with the home scre	en, and will not be
logged in.	
1 The user can r	navigate to the login page,
or complete trainin	g "games"
anonymously, whic	h will not save their
scores to the datab	ase.
If the user would like	ke to log in, and save
their scores to the	database, they can
2 log into their a	account by pressing the
"Login" button.	
This action will brin	g them to the page
1 provided on the	ne following page.
12	
Login	
Once the user navig	gates to the login
page, they can eithe	er log in with their
previously created	account, or register

1 a new account by pressing the

"Register" button.

Once the user registers a new account,
1) they are brought back to the login page,
and can enter their account details.
① Once the user has pressed login, and
the account is valid, they are brought
① back to the home page.
The register page is shown on the
following page.
13
Register
Once the user navigates to the register
page, they can enter their account
details, and press the "Register
Account" button to create a new
① account on the system.
Once the user registers a new account,
① they are brought back to the login page,
3 and can enter their account details.
The register page has input validation,
① so the passwords must match, and the
username cannot be in use by another
account.
14
Replace Books
The "Replace Books" page can be
accessed by pressing the "Replace
① Books" button on the main menu,
which opens a new "game" or training
session.
The replace books training session
works by getting users to re-order the
randomly generated call numbers, in
numeric and alphabetic order – just like
4 the Dewey Decimal system describes.
Once the user is ready to start the
training session, they can press the
"Start" button, which will refresh the
call numbers and enable dragging of
the Dewey decimals on the data grid.

Once the order is correct, the user will immediately be navigated to a confirmation page, where they can view the model answer, or return to 1) the main menu. Replace Books The user may re-order the books by dragging them across the page (clicking, holding, and moving them), which will allow the books to be re-ordered. 1) As can be seen on the provided image, the books have been partially ordered, and the timer is ticking down from 60 seconds, as the difficulty level has been set to "Easy" on the home page. Confirmation Page As soon as the correct order has been reached (once the call numbers are in their correct order), the user will be navigated to a confirmation page. Firstly, this page will show whether the user has successfully ordered the books, with a confirmation message, and the time it took them to complete the session. This confirmation page also provides the user with the ability to "View Order", which allows them to access the model answer for the training session. Users can press the "View Order" to view this page. It also allows them to return to the 1) main menu by pressing the "Finish" button. The "View Order" model answer page is 1) shown on the following page. 17 Correct Book Order The "View Order" page is provided on the left, which shows the correct order of the Dewey decimal call numbers.

The user may press the "Finish" button to navigate back to the main menu after they have viewed the correct order for the call numbers. 18 Identify Areas The identification of areas can be accessed by pressing the "Identify 1 Areas" button on the main menu, which will navigate the user to the provided page. This match-the-column training exercise provides the user with 4 randomly picked categories within the Dewey decimal system, and 7 potential answers on the right-hand side. 1 The user can press "Start", which will randomize the questions and answers again, and will allow the user to select the correct answers from the dropdown boxes in the middle of the 1 page – shown on the following page. **Identify Areas** The user may select the "Start" button, and select all their answers from the dropdown boxes next to each question. For example, the image provided shows the answers to the provided training session. This training system also has gamification techniques implemented, in the form of a countdown timer, and logging of scores, much like the "Replace Books" exercise. Once columns have been matched, by selecting an answer for each question from the dropdown boxes, the user can select "Next" to navigate the user to the confirmation page. 1 Input validation has been implemented on this page, so all inputs have to be valid. 1) Shown next is the confirmation page.

Confirmation Page Once the user has selected "Next" or the timer has run out, the user will be navigated to a confirmation page, where it will be determined if all answers were correctly answered (the columns were matched correctly). If so, the user will be provided with their time. The user can navigate back to the main menu by pressing the "Finish" button, view the model answer by pressing "View Answers", or press "Next" for another "Identifying Areas" training The model answer page is provided on the following page, where the answers 5 for all questions are provided. Correct Book Areas If the user presses the "View Answers" button, a page with the model answer will be provided, so that the students and librarians can learn from the system, and not only test their 4 knowledge of the Dewey decimal system. 1 If the user presses the "Return" button, they will be brought back to the confirmation page, where they can continue with another identifying areas session, or finish the game. 22 View All Scores – Replacing Books If the user presses the "View All Scores", a page with all their personal scores will be displayed for both the "Replace Books", and "Identify Areas" training sessions.

just above the "Return" button, and all their scores for that game / training 1 type will be displayed. View All Scores – Identifying Areas If the user selects the dropdown box from above the "Return" button, they are presented with all "game" types, including "Replace Books", "Identify Areas", and "Find Call Numbers". This can be set on the main menu page as well, where the top ten scores are shown. The following image shows the scores for "Identify Areas" training sessions for 1 the logged in user. This includes the username, score, and the time that the test was taken. Set Game Difficulty If the user wishes to change the game difficulty, by reducing the total time that is allowed for each training session, they can set the difficulty - the lowest dropdown element on the provided screenshot. This will set the times of the counter to 60 seconds for Easy, 40 seconds for Medium, and 30 seconds for Hard difficulties. 25 Database Entities The User model defines what is saved for 1 each user in the system. This includes the user id, username, and password. The Scores model defines what is saved for each score entry in the database, which includes the username of the user who achieved the score, the score value, and the date and time that the entry was inserted into the database.

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(1) Conclusion In conclusion, this documentation has provided extensive development information in order

to detail how and why the Dewey Decimal desktop application was developed in the way

that it was. 1 It described each function of each page within the "Help File" section, and

provided user interface design information within the "Screenshots" section. A "Readme"

1 section was also included in the document to provide information about the development

environment, instructions on how the desktop application should be run, and other such

critical information to get the application running on the user's PC.

① Additional information such as all the database entities was provided, which detailed how

and where data was stored by the application.

In addition to the above, a use case diagram was included, which showed core functionality

of the desktop application from the user's perspective.

During the course of this project, we have learnt how to develop advanced C# desktop

applications in the .Net Core 3.1 Framework. We also learnt how to use a Data Access Layer

– DAL to access information from a local MDF file, and later on this will be hosted online. In

addition to this, we have learnt how to use advanced data structures, including Doubly

Linked lists, Dictionaries, Key Value lists, and Observable Collections in addition to other

datatypes.

1) Once we receive feedback for this task, we will be in a position to complete Task 2 and POE

tasks, which build on the functionality of this application.

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techniques-to-your-content/

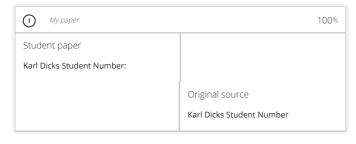
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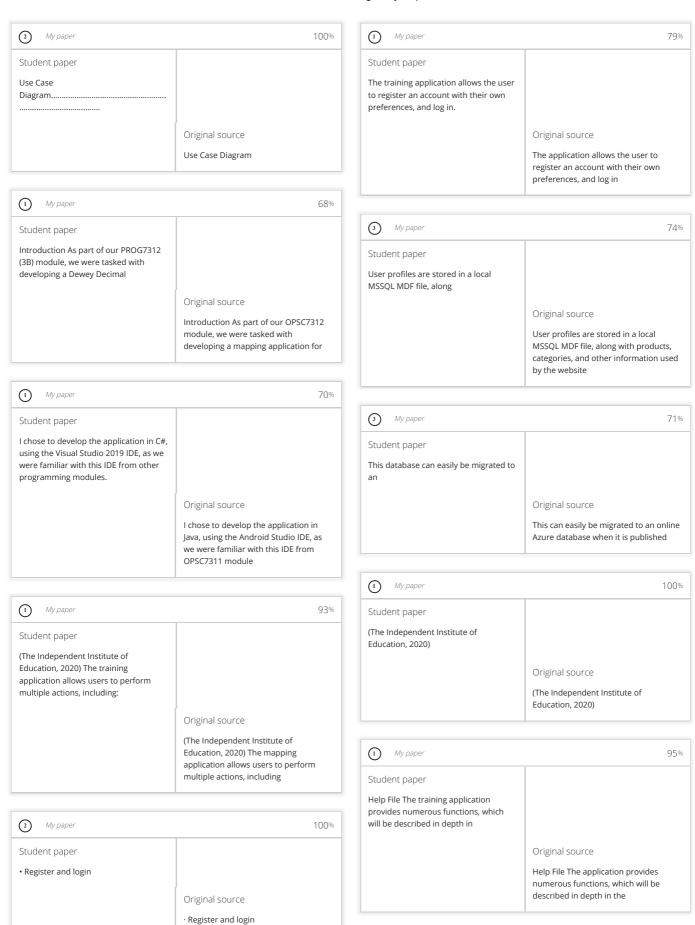
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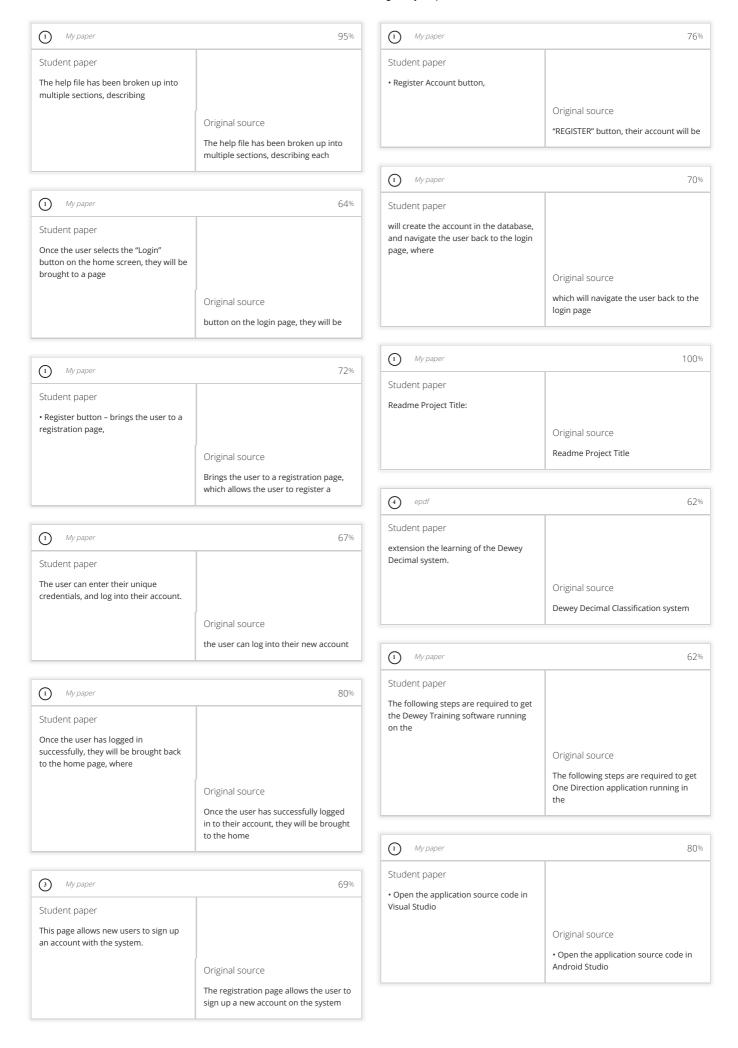
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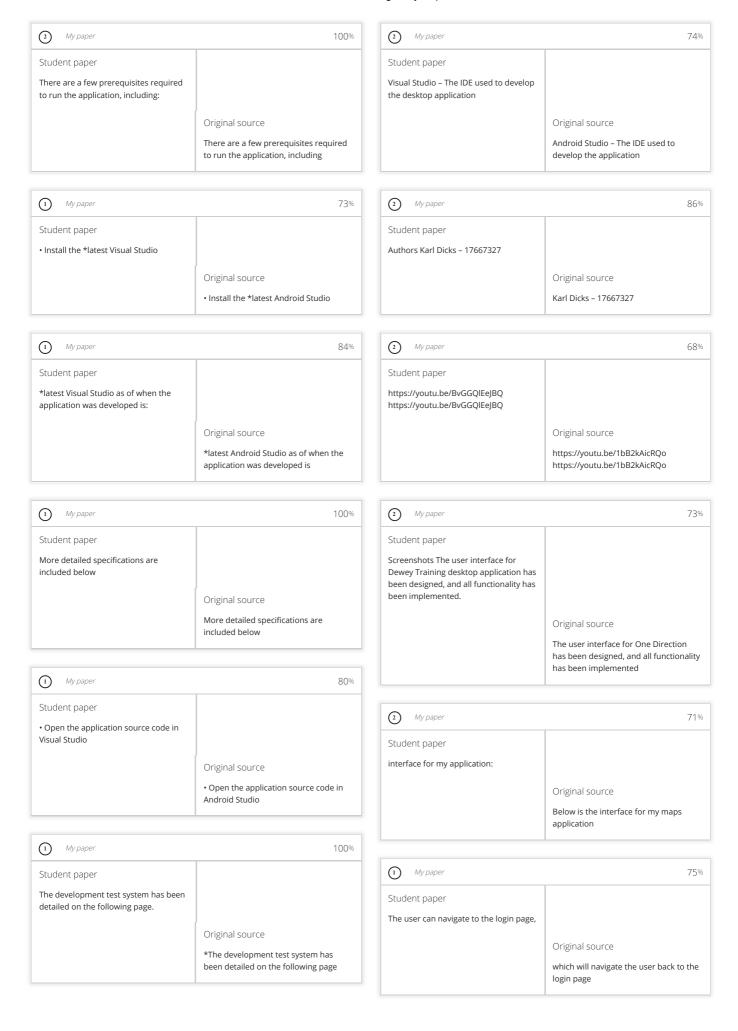
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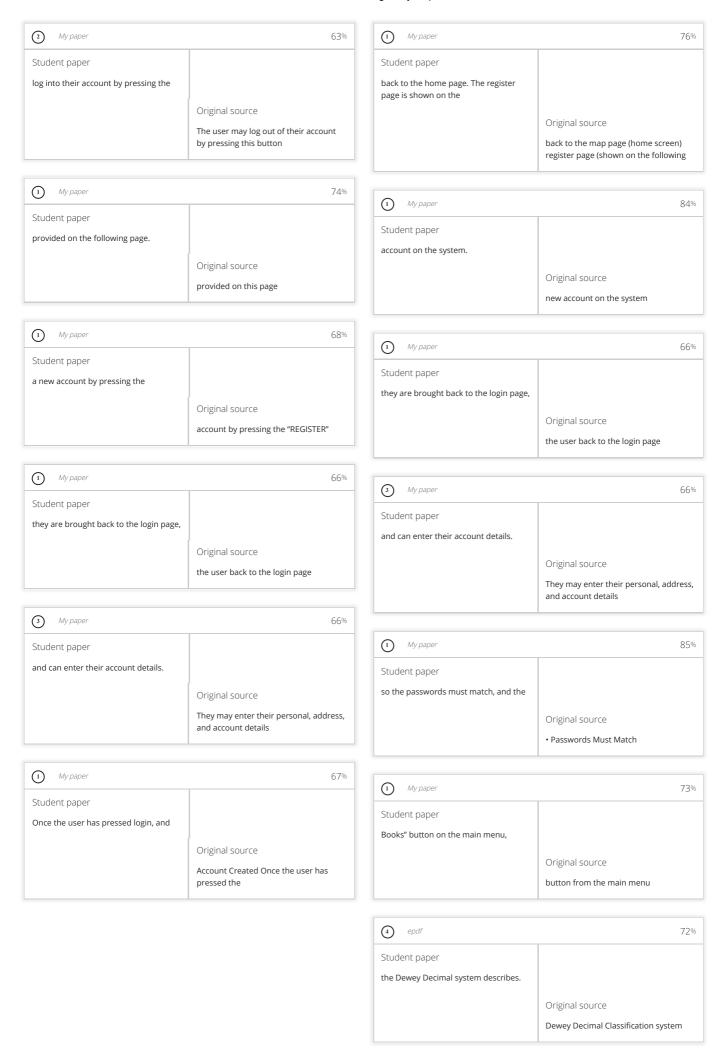


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