A new design proposal for virtual school

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Abstract:

During the past period, with the presence of the Corona pandemic and the closure of schools more than once, we all felt the utmost need for new educational methods capable of delivering information to students, especially children, in an enjoyable way. In addition to introduce the possibility for children to interact with each other and with their teachers in an attractive and effective manner, from this point the research problem arose, where we noticed that many children do not want to learn and suffer from boredom feeling in addition to inefficient communication between them and their teachers in distance learning process, **The aim** of this research is to present a new design proposal for the virtual school called "Docamii" by proposing some interactive features that enhance the interaction between children and their teachers to enhance the efficiency of virtual school environments moreover considering some design principles that help to deliver the information to children in an enjoyable manner through distance learning process. **The findings** of the research clarified a satisfactory impact of the proposed interactive features used in "Docamii" to enhance the communication between children and their teachers in virtual school environment furthermore delivering the information to children in an enjoyable manner through the application of the proposed design considerations used in "Docamii".

Introduction:

One of the major problems that the world faced during the Corona pandemic is education; specifically, education for kids between the ages of 4 and 11 who might face difficulty in adapting to the lockdown and suffer from the lack of interaction between each other and their teachers.

To make sure that the problem exists between children the author made a survey on 100 children and 50 teachers and the results showed that 74.5 % from children agreed that they faced lack of productivity and boredom during distance learning, while 88.7 % from children agreed that they faced a lack of communication between them and teachers. And 55.1 % from teachers agreed that they weren't able to structure proper educational content due to online systems' limitations.

This paper will try to contribute to solve this problem by creating a new design proposal for virtual school called "Docamii" by adding a new interactive features that may help children and teachers to be communicated through online classes moreover considering some design principles to ensure delivering the information to children in an enjoyable manner to avoid boredom feeling during online classes.

Problem Statement: The problem of this research can be summarized in the following questions:

1- will the proposed interactive features used in "Docamii" enhance the efficiency of virtual school environments?

2- Will the application of the appropriate design considerations in "Docamii "help children to have the information in an enjoyable manner?

Research aims: The research aims to:

1- Presenting a new interactive features in the design proposal for the virtual school "Docamii" and measuring its impact to enhance the efficiency of the virtual school environments

2- Implementing the appropriate design considerations in "Docamii " to deliver the information to children in an enjoyable way.

Research hypotheses: The research assumes the following:

1- Exploiting modern interactive features in the new design proposal of "Docamii" may enhance the efficiency of virtual school environments

2- Taking into consideration the appropriate design principles in the new design proposal for virtual school may help to deliver information to children in an enjoyable way.

Research Methodology: The research relied on the applied study by presenting a new design proposal for the virtual school and measured its impact on children and teachers through a questionnaire forms.

Literature review:

Traditional education in the past depended on teachers in the class, followed by films or animations to support after class, but seldom students with weak comprehension and memory

can't understand in the classroom at one time. They can only read books at home. This is the previous way of learning in the past. With the advancement of technology, Electronic products are popular until virtual school environments be created nowadays. They change the usual boring education into an enjoyable one , hence students can feel more profound experiences and find them interested in learning. (L Peng, 2019)

Virtual School Environments: are computer-generated environments enabling students to navigate and interact in real time with the environments so that their actions are experienced in the present moment, allowing them to actually feel present in the virtual environment (Moïse-Richard A, 2021, p. 3).

According to (An, 2018, pp. 28-29) The main purpose of virtual schools is to provide flexibility, choice, equity, and access to high-quality educational opportunities for all students by providing access to high quality or rigorous curricula moreover to help students who are unable to attend a regular school in their local district, and to offer opportunities for students who cannot be readily accommodate through the traditional classroom.

The study of (Neil Gomes, 2019) revealed that Immersive interactions in virtual school environments are more engaging to students furthermore virtual content have significant impact on learner motivation. Perceived ease of use and perceived usefulness are other factors that affect learner engagement along with the type of content and the learners' comfort with new and emerging technology used in virtual school environments.

In the same context the study of (S E Pramono, 2019, p. 5) proofed that the utilization of virtual labs as a part of the virtual school environment for elementary school students are able to improve their problem-solving skills in science. In addition to offer the opportunity to learn by doing, exciting, motivating activities to discover and to solve problems systematically. Students are able to experiment as much as possible without limitation on tools, time, and place. The study also revealed that the use of colorful interfaces and the use of pedagogical agents will be the solution to the lack of infrastructure for science learning.

Another study by (Driscoll, 2013) proposed that the virtual school environments can promote communication and co-operation between social care and education; ensure that the educational of looked after children is given high priority within local authorities and schools; and facilitate the translation of corporate parenting policy into individual attention to the unique needs of young people.

For the proposed design for virtual school environment the author classified the following:

Interaction: virtual school environment should enhance the relationship between the child, teacher, and the environment. Children should be in charge of their own activities, supported by the teacher and the environment. The teacher observes the environment and the children, to make adjustments where necessary to meet the children's needs (Davies, 2019, p. 13).

Social and intellectual Environment: the purpose of the virtual school environment is to help children learn and socialize with their teachers and colleagues in an enjoyable manner . through interacting with virtual school environment, children learn to encourage and develop a sense of compassion and empathy for their collogues. As children develop, they become more socially aware, this social interaction is supposed to be supported throughout the environment of virtual school environment (Irinyi, 2009).

Graphical User Interface (GUI) considerations for designing virtual school environment:

visuals are an effective tool to grab children attention which encourage them to be motivated to learn and play through the virtual school environment (Pang, 2021, p. 179) The following design considerations are:

- Interactive features like buttons and links should be designed with simple approach because Simplicity makes every single element in the design clearer and make the eyes comfortable while interacting. It is also helping the design to be intuitive which led to the appropriate usability.

- Cartoonish style is crucial to be considered while designing user interfaces for children it can be applied in designing characters and the whole theme of the virtual school environment.

- colours should be chosen carefully to guarantee grabbing children's attention toward the design and to make the interactive features more clarified.

- Festive visuals: Everyone likes getting rewards, and offering children the chance to earn them in virtual school environment is an excellent source of motivation. When children answer right or finish their assignments correctly a festive visual with happy sound appear to give them positive feedback to make them feel that they did a great accomplishment. (Ahmed Sayed Ali, 2021).

Methodology :

The author went through experimental study by designing Incentive-based learning platform called "Docamii" that transforms young children's

learning experience into an immersive game. It's a software with an incentive-based philosophy that aims to improve children's overall performance and productivity by creating an immersive virtual simulation of their school

Quantitative approach was applied to both children and teachers to measure the impact of the proposed software to enhance delivering the information toward children, furthermore to measure the role of communication capabilities in this proposal in improving the communication between children and their teachers through distance learning process.

children and teachers can create their own customized avatars and interact with each other in a simulated school to add the gamified and childish spirit to the design to guarantee delivering the information toward children in an enjoyable way, some Interactive features like interactive content were applied to enhance the communication process and add the joyful feeling toward children during distance learning process.

Description of the proposed design for virtual school environment:

Logo concept: Logo design of this software based on the graduation cap and at the top of this cap is the buttons of the PlayStation joysticks which visualized the philosophy of this proposed design that children will learn and succeed through playing the games they love. (Figure 1)

Figure (1) the logo design of the proposed software called "Docamii"

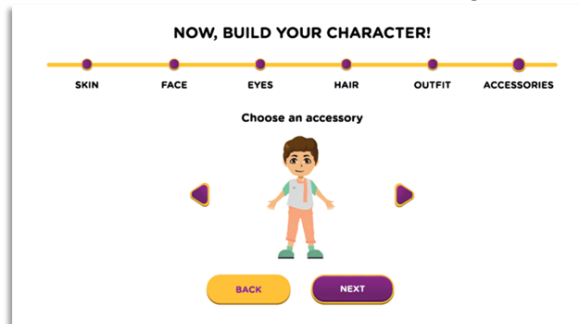Name Philosophy : The name " Docamii "comes from 2 Latin words: "Doctrina" meaning to learn;

and "Amica" meaning a friend so the meaning of "Docamii" is a friend that teaches you good things , Docamii is a *learning* software; nonetheless, it will still act as a 'friend' to all users since it will provide them with lots of fun activities to do. The paradox lies in how the app is very friendly and fun, yet still acts as a fruitful learning software.

Value proposition: "Docamii" is not just an educational platform, it is also a social one that maintains childrens' relationships with each other and their teachers.

For instance, "Docamii" allows students to create their own avatars, which can then interact with avatars of other students and teachers.

Target Audience:
- children aged from 4 to 11 years old (pre-school to 5th grade).
- Parents and teachers as a mentor.

Proposed Interactive features:

Avatar creation:

To enhance the interactivity in "Docamii" the avatar creation feature was added by making both children and teachers make their own avatars to simulate it with the games that children have already played in their real life and to make the educational process more enjoying and fun to them, in addition to make the teachers closer to the children by letting them also choose their own customized avatar (Figure 2)

These avatars can be played like humans in the virtual school children can talk and play with each other and their teachers (Figure 3)

Reward system: Children can collect points, badges and rewards through answering questions in class, showing good class behaviour, or participating. These points could be used to unlock other features such as mini-games and custom outfits for their avatars (Figure 4), these features designed to add the gamification features in the proposed design to motivate them to learn in an enjoyable manner

Fig (2) Avatar creation feature to add enjoyable feeling

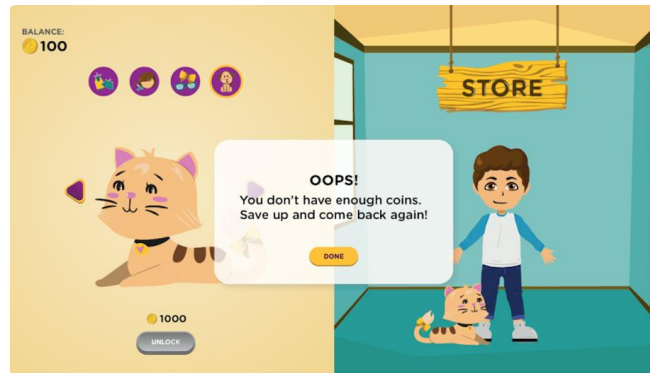**Fig (3) Children and teachers can interact with each other through their avatars**

Fig (4) Incentives are given to children to unlock some feature to motivate them to learn

Augmented reality: In order to make children move and learn the augmented reality features were added to the proposed design like the sample showed in (Figure 5) where the quiz is to make children scan anything with orange or yellow colors, children are supposed to scan the objects with a mobile camera then they read a relevant information to the color they scanned these features make children think and have fun while learning and gaining knowledge in an enjoyable way which can enhance their learning experience .

Dashboard: Dashboard is a very powerful tool to facilitate childrens' interaction through "Docamii" children can have a quick and easy access to quizzes and information and morover, they can communicate easily with each other and their teachers. (Figure 6)
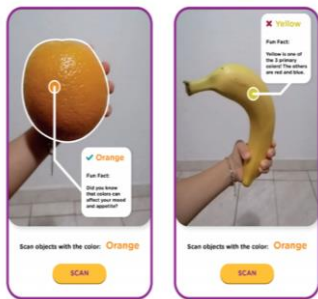

Fig (5) Augmented reality feature can enhance the retention ability to children
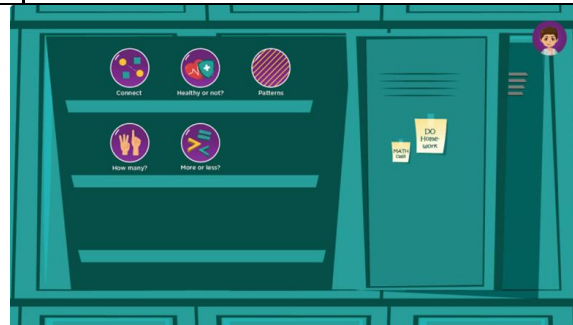

Fig (6) Dashboard facilitates the interaction and communication

Interactive content: Interactive content is essential to make children think and learn efficiently as we can see in (Figure 7) children can learn the difference between healthy and non-healthy food with simple visual interactive elements and instant feedback with festive visuals to make them know if their answer was right or wrong which help to enhance their retention abilities and make them feel that they are playing instead of boredom feeling they have during traditional ways of learning

Teacher account: Teacher account is an important interactive feature in the proposed design for virtual school "Docamii" where teachers can see the performance of their students to know their educational progression through the visualized chart that represent the performance over weeks. Furthermore, they can know the school's news and announcements, their schedule and tasks moreover communicate easily with children if needed,(Figure 8).
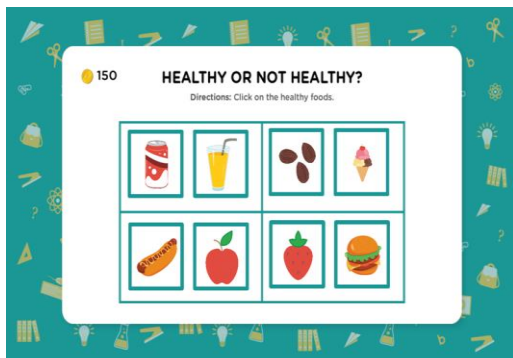

Fig (7) interactive content to make children have fun while learning and enhance retention ability
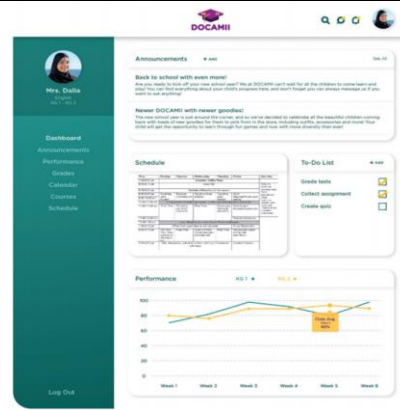

Fig (8) Teacher account help teachers to know the educational performance of their students

Proposed Design Considerations:

Childish look: Illustrations were the main visual elements that were chosen to enhance the childish look and feel to make children feel they play in a real game and to enhance the gamification experience to them the childish look was applied by considering the following:

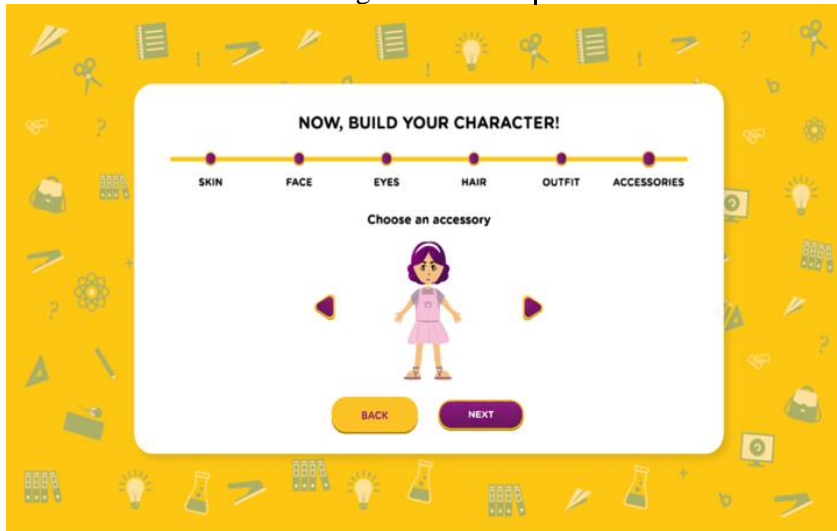1- A different cartoonish character for each avatar, (Figure 9).

Fig (9) Difference in character designs to enhance the gamification experience toward children

2- The virtual environment for classroom is also illustrated with cartoonish style to enhance the whole experience while interacting.

3- The garden and the playing area for the virtual school to let children interact, play and having breaks throughout the school day to socialize with each other like they do in their real schools . (Figure 10)
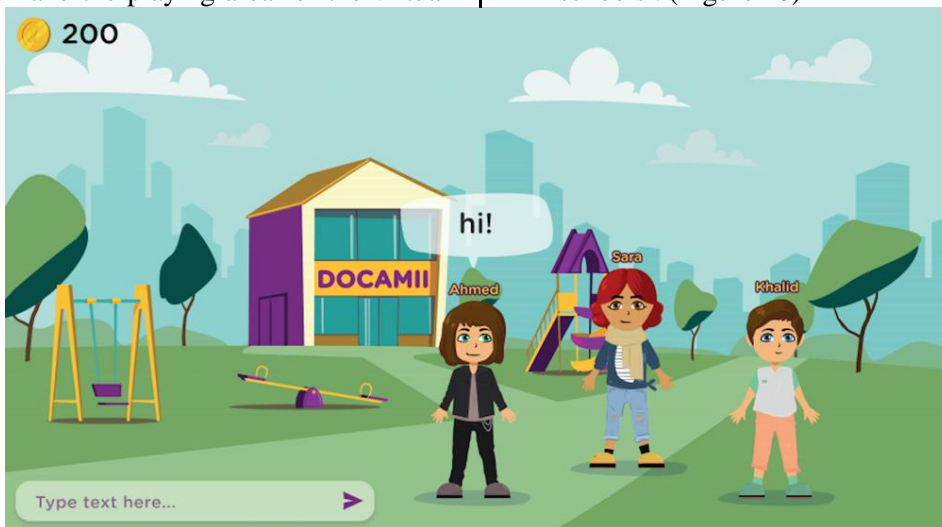

Fig (10) childish style was applied to enhance the gamification experience toward children

Colors: High saturated and bright colors were chosen in the design of the layout to grab the childrens' attention and to add a playful spirit

Yellow color as a main color was chosen in the design of the logo moreover in the backgrounds as it is a color that trigger the perception abilities of children which help them to think while interacting with the content , the main other color was the marron color which is the other main color in the logo design this color is darker than yellow which add a high level of contrast that help children to focus on the information this color was mainly chosen in the design of the interactive features like buttons which enhance the intuitiveness of the design and facilities children to interact easily,

Green color was also one of the colors that was chosen in the design because of its calmy effect which help children to relax and think. (Figure 11).

Visual feedback: Feedback screen with festive visual and happy sound after accomplishing any step was applied in the proposed design to encourage children to play and to let them feel that they did a great accomplishment which enhance the feeling of achievement and motivate them to learn and play more (Figure 12).

The way of interaction in the proposed design:

After welcoming screen children are asked to create their own avatar depending on their gender and then enter the virtual school (Figure 13).
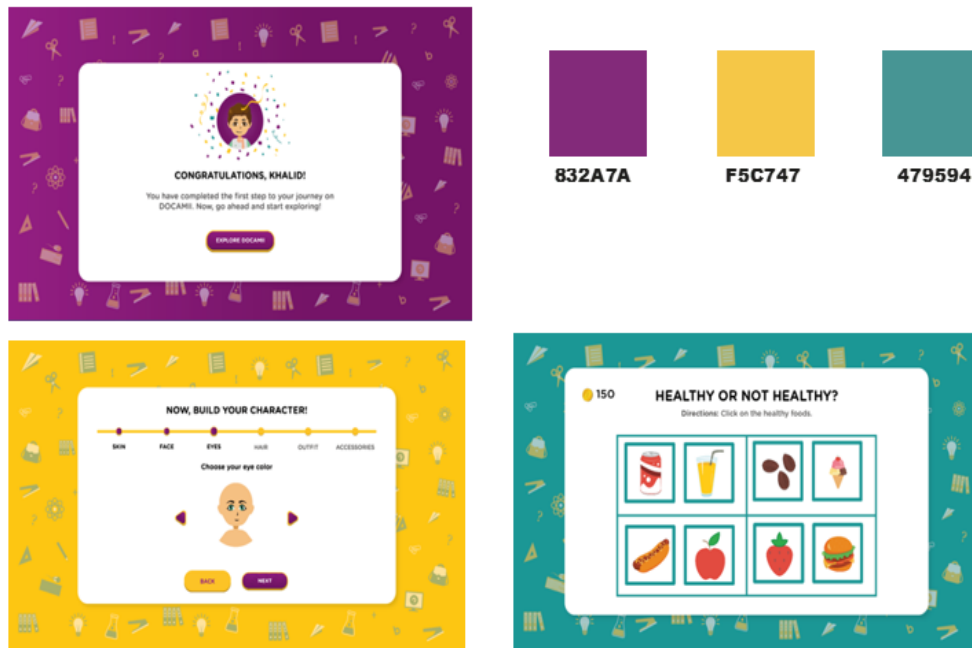
Fig (11) high saturated and bright colors were chosen to enhance the childish spirit of the design
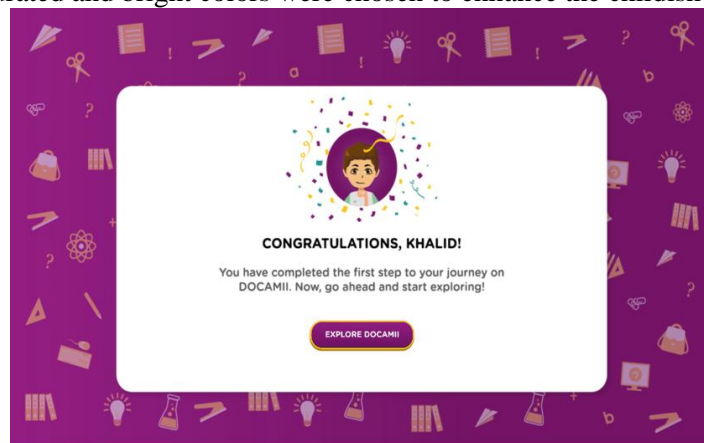

Fig (12) Feedback screen with festive visuals to motivate children to play and learn more
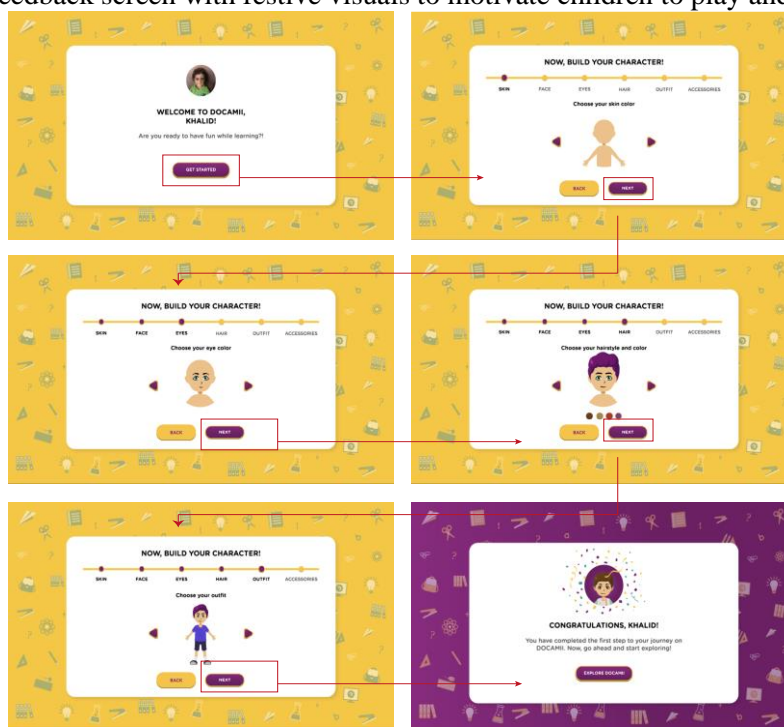

Fig (13) the steps of creating Avatar

Then children go to the dashboard where every child has his own options depending on his performance in the virtual classroom , dashboard shows the activities and inform child with the assignments and exercises that he has to do to enhance his progression by offering a supportive quizzes in a gamified format to let him play and learn in the same time in order to gain coins and

badges which simulate the real games , After gaining coins children can go to store screen to add some remarkable features to the avatar like pet or unique accessories which is a very powerful tool to create the compete spirit between children and motivate them to learn , play while having fun (Figure 14).
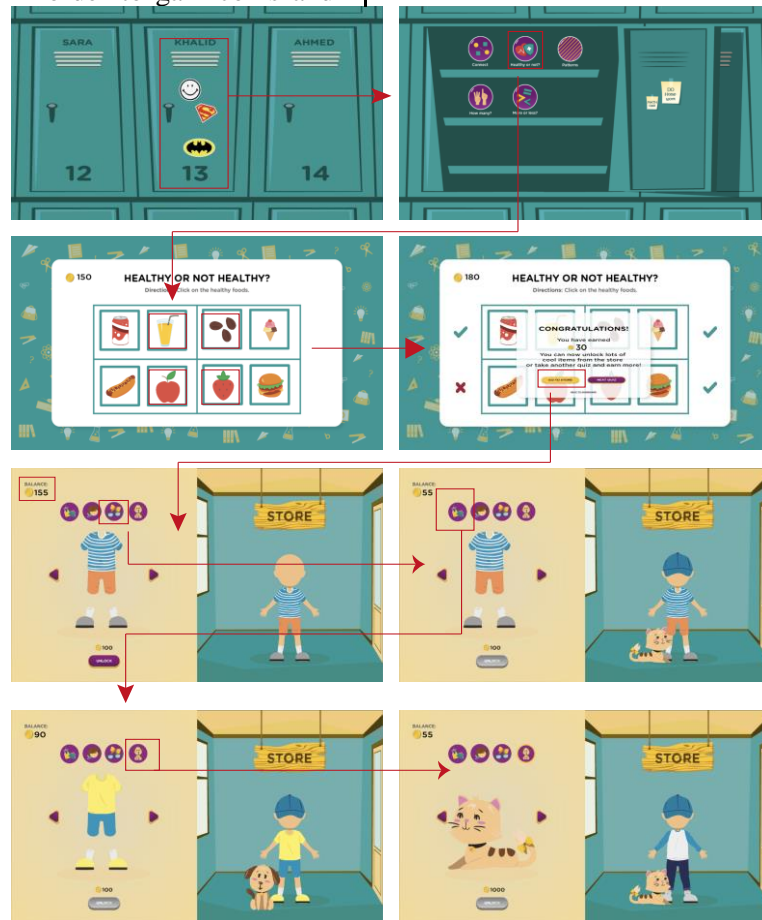

Fig (14) Dashboard and store screens

Main considered benefits in the proposed design:

The proposed design for virtual school "Docamii" will provide children with the chance to learn and socialize in an interactive, immersive school setting. It has an advanced gamification base that builds a more productive, boredom-free learning experience. The main philosophy for Docamii accentuates the importance of keeping students engaged to achieve maximum efficiency. The way of planning to attain that target is through 3 actions: encourage, reward, and trigger. By creating a functional system that rewards child achievements through the provision of points and badges, Docamii ensures that children will always remain motivated enough to excel in class. However, keeping them occupied requires more than just creating a game. Thus, Docamii provides children with an immersive cartoonized school setting as well as a social platform for them to interact with one another during breaks between their online classes. Docamii, hence, creates the perfect,

balanced recipe for a successful and productive yet fun learning experience. docamii's immersive gamification features, together with a potent UX/UI design, sets a new standard for how an virtual school can be like, including features like mini games, chat bots, and AR compatibility. It aims to improve students' productivity through an immersive learning experience.

Procedures of the experimental study:

The designed proposal for virtual school "Docamii" was displayed to both children and teachers by asking them to interact with it, Quantitative approach was applied through asking 100 children and 50 teachers some questions after interacting with "Docamii"

The study aims to reveal if the proposed interactive features and design consideration in "Docamii" will increase its efficiency and transfer the information toward children in enjoyable manner. The author focused on investigating two main research questions:

Q1. will the proposed interactive features used in

"Docamii" enhance its efficiency?

Q2. Will applying the appropriate design considerations in "Docamii "help to transfer the information to children in an enjoyable manner? Based on the highlighted research questions, This study attempted to test the following research hypothesizes:

H1. Exploiting modern interactive features in the new design proposal of "Docamii" may enhance its efficiency.

H2. Taking into consideration the appropriate design principles in the new design proposal may help to deliver information to children in an enjoyable way.

Participants:

Table (1) characteristics of the chosen participants for questionnaire

	Age	Gender	Education	Reason of choice
Children (100)	From 4 to 10	Both	Children in primary schools	Children In this age like to play games with tablets instead of studying so "Docamii" as a software with its childish design and gamified features will be convenient for them
Teachers (50)	From 22 to 40	Both	Highly Educated teachers in primary schools	Teachers in distance learning faced a lot of troubles to deal with children online so their opinions about the proposed design will be highly considered in order to develop and enhance this proposal in the future

The Purpose of the experimental study is to measure the following :

Table (2) The measurements of the experiment

Efficiency		
Social Interaction	**Motivation**	**Retention ability**
Ask children if these Avatars, are you and your friends, will you socialize with them through "Docamii"?	Ask children if the applied reward system is efficient to them by asking them if they want to play with their avatars to collect points to unlock some features?	After playing with "Docamii" ask children a question like Is strawberry healthier than burger?
Design consideration		
Cartoonish style	**Colors**	**Joyful and entertainment**
Did you like the characters and the cartoonish elements in "Docamii"?	Do you like the colours of "Docamii"?	Did you enjoy playing with "Docamii"?

Results:

In order to take an accurate answer from the participants, 2 questionnaire forms were designed one of them was to be asked to children while the other one was for teachers the questions and the answers with the obtained results from both forms are clarified in Table (3)

Table (3) the questions and the answers with the obtained results from both questionnaire forms

	Questions	Yes	May be	No
Questions to children	1- if those Avatars, are you and your friends, will you socialize with them through "Docamii"?	82.3%	10.3%	7.4%
	2- Do you want to play with your avatar to collect points to unlock some features?	75%	20%	5%
	3- Is strawberry healthier than burger?	80%	-----	20%
	4-Did you like the characters and the cartoonish elements in "Docamii"?	76.5%	17.6%	5.9%
	5- Do you like the colours of "Docamii"?	89.7%	10.3%	0%
	6- Did you enjoy playing with "Docamii"?	82.9%	14.3%	2.9%
Questions to teachers	Questions	Yes	May be	No
	8-Do you believe that children will love to make their own avatars and use them to interact with each other in	72.3%	23.1%	4.6%

|		Yes	May be	No
	virtual school?			
	7- Do you think that "Docamii" as an incentive-based software will children to learn in an enjoyable manner?	84.8%	9.1%	6.7%
	9- Do you think information presented to children in a game-based technique will be more understandable and memorable to them?	85%	25%	0%
	10-Do you believe that the cartoonish style will be convenient toward children while learning?	100%	0%	0%
	11-Did you find the colors attractive to the children?	87.5%	10.5%	2%
	12-Do you think that children will enjoy Docamii?	76.9%	23.1%	0%
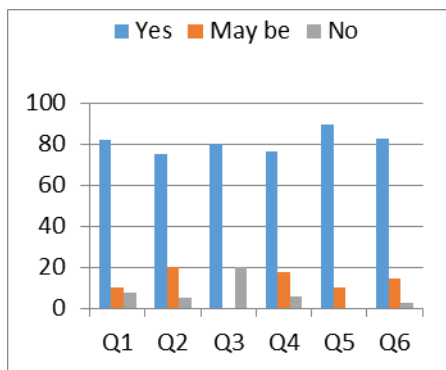
Fig (15) Statistic to show the percentage of answers the questions that were directed to children
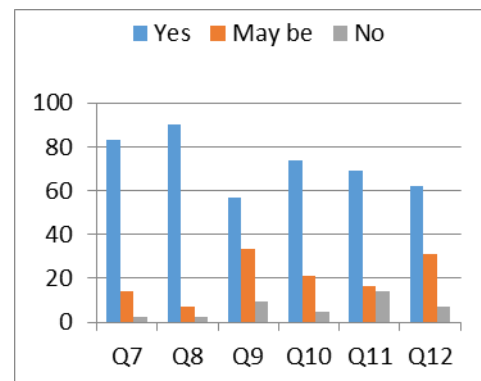

Fig (16) Statistic to show the percentage of answers the questions that were directed to teachers

Discussion:

This experiment aimed to evaluate the efficiency of "Docamii" on children

- Avatar creation feature was applied in the proposed design to humanize the interactive experience toward children and to use them to socialize in the virtual school like a real game 82.3% of children found that avatar creation feature is a useful tool to be used in socializing with their friends and teachers, while 72.3% of teachers agreed that children will love to make their own avatars and use them to interact with each other in the virtual school which enhance the Social Interaction.
- Reward system and incentives were given to children after playing and making quizzes in the proposed design to motivate them to learn in an enjoyable manner 75% of children found a motivation while playing with their avatars to collect some points and unlock some features for their avatars to be unique in the virtual school environment, while 84.8% of teachers agreed that children will be motivated through the incentive-based system in "Docamii" to learn more in an enjoyable manner.
- 80% of children after playing with the interactive learning games in "Docamii" remembered that strawberry is healthier than burger which is a

good indication that this way of learning enhance the memorability of information, 85% of teachers agreed that the game-based technique used to present the information in "Docamii" enhance the retention ability toward children.
- 76.5% of children liked the cartoonish style used in "Docamii", while 100% of teachers found that this style will be convenient for children.
- Bright and high saturated colors were applied in the proposed design of the virtual school to grab childrens' attention 89.7 % of children liked the used colors and 87.5 % of teachers found that colors are convenient toward children.
- joyful and entertainment was achieved and measured by asking children if they like "Docamii" and the result was promising as 82.9 % of them loved to play and learn through "Docamii" , 76.9% of teachers agreed that children will enjoy "Docamii" as a new learning method for distance learning process.

The results obtained regarding proposed Interactive features of "Docamii":

- The usage of Avatar creation as an interactive feature will enhance the social interaction between children and teachers in the virtual school environment.
- Incentive based system is a very powerful tool to

motivate children to play and learn more to unlock some features to make their avatars more unique among other avatars.

- The game-based technique used to present the information in "Docamii" enhance the retention ability toward children.

In accordance with our hypothesis (H1) we found that the usage of "Docamii" with its proposed interactive features has a great potential to increase the efficiency of virtual school environments.

The results obtained regarding proposed design considerations of "Docamii":

- Considering the Childish style when designing illustrations, characters and other visual elements in virtual school environments for children will be more convenient to them.
- Bright and high saturated colors are more convenient to children when designing the virtual school environments.
- Providing feedback screen with festive visuals enhance the feeling of accomplishment toward children and motivate them to learn and play more.
- Children liked to play and interact with the interactive features in "Docamii" and showed a good attitude while playing, so this proposal has a high potential to avoid the boredom feeling during online classes and distance learning process.

By looking to the obtained results from children we found that they liked the cartoonish style of the visual elements and characters furthermore a high percentage of children found that the colors are convenient to them and they were motivated to play more after seeing the feedback screen with festive visuals after accomplishing a quiz or exercise. In accordance with our hypothesis (H2) we found that considering the appropriate design principles while designing for virtual schools will help children to learn in an enjoyable manner.

Conclusion:

In this paper the author examined the impact of applying interactive features in the design of virtual schools like avatar creation in enhancing the communication between children and their teachers, reward system to motivate children to play and learn more and the enhancement of retention ability of children through interact with the information and play with it in increasing its efficiency Furthermore, examining the implementation of appropriate design considerations in the visual design of virtual school and its role to transfer the information to children in enjoyable manner. the results revealed that the hypotheses H1. Exploiting modern interactive features in the new design proposal of "Docamii" may enhance the efficiency of virtual school environments, H2. Taking into consideration the appropriate design principles in the new design proposal for virtual school may help to deliver information to children in an enjoyable way are not rejected

This study contributes to put a new vision of designing the virtual school environment to children by proposing an interactive features and design consideration to be implemented in the design of virtual school environments to increase its efficiency and transfer the information to children in an enjoyable manner.

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